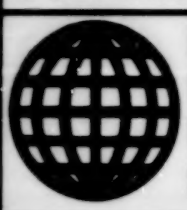
JPRS-UST-88-014
19 DECEMBER 1988



FOREIGN BROADCAST INFORMATION SERVICE

JPRS Report

Science & Technology

USSR: Science & Technology Policy

Science & Technology
USSR: Science & Technology Policy

JPRS-UST-88-014

CONTENTS

19 DECEMBER 1988

Organization, Planning, Coordination

Pilot Experimental Bases, Effectiveness of S&T Potential
[A.V. Abeltin; IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR, No 7, Jul 88] 1
Costs Associated With Introduction of New Technology Discussed
[Z. Korovina; PLANOVOYE KHOZYAYSTVO, No 9, Sep 88] 6

Budget, Finance

Marchuk on Competitive Financing for Academy Programs
[G.I. Marchuk Interview; IZVESTIYA, 18 Nov 88] 13
Procedures for Financing Scientific Research, Experimental Design Work
[BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR, No 5, May 88] 14
Determination of Budget Allocations for S&T Research
[BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR, No 5, May 88] 17
Procedures for S&T Contract Work
[BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR, No 5, May 88] 17
Economist Defends Law on Cooperatives for S&T Research
[O. Osipenko; NTR: PROBLEMY I RESHENIYA, 21 Jun-4 Jul 88] 19

Facilities, Manpower

S&T Progress, Redistribution of Manpower
[V. Kostakov; IZOBRETATEL I RATSIONALIZATOR, No 5, May 88] 22
Presidium of USSR Academy of Sciences Announces Organizational Changes
[VESTNIK AKADEMII NAUK SSSR, No 5, May 88] 25

Training, Education

Training Personnel for CEMA S&T Program
[V. Kokarev, V. Andriyeshin; EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV, No 4, Apr 88] 28
Postgraduate Training for Engineers *[O. Brinkmanis; SOVETSKAYA LATVIYA, 10 Aug 88]* 31
Self-Financing Causes Monetary, Education Conflicts in VUZ's
[M. Komarovskiy; SOVETSKAYA ROSSIYA, 5 Oct 88] 32

Automation, Information Policy

GKVTI Official Comments on Achieving Western Levels of Computer Technology
[V. V. Korchagin Interview; IZVESTIYA, 30 Sep 88] 34
Computer Advisory Group Recommends R&D Strategies
[S. Pachikov; NTR: PROBLEMY I RESHENIYA, 16 Aug-5 Sep 88] 36
Success of Temporary Computer Collective 'Start' Described
[N. Manuylov; EKONOMICHESKAYA GAZETA, No 34, Aug 88] 38
State Policy on Disseminating S&T Information Needed
[O. V. Kedrovskiy; EKONOMICHESKAYA GAZETA, No 33, Aug 88] 40
Poor Record for Publications in Theoretical Physics Described
[V. Ginzburg, P. Volkovitskiy; IZVESTIYA, 16 Sep 8] 41

Regional Issues

Status of S&T Work in Belorussian Agriculture
[I. Nikitchenko; KOMMUNIST BELORUSSII, No 7, Jul 88] 43
Kolbin Speech at Kazakh Academy of Sciences General Session
[G. I. Kolbin; VESTNIK AKADEMII NAUK KAZAKHSKOY SSR, No 7, Jul 88] 46

Awards, Prizes

Latvian Academy of Sciences Awards Prizes
[IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR, No 4, Apr 88] 52
Candidates For Lenin, State Prizes Named *[IZVESTIYA, 9 Jun 88]* 55
Candidates for Lenin Komsomol Prize for 1988 Listed *[KOMSOMOLSKAYA PRAVDA, 12 Jul 88]* 58

General

Soviet Scholars Study U. S. Management Experiments
[A. I. Izyumov; TEKHNIKA I NAUKA, No 8, Aug 88] 62
Letter Provokes Heated Discussion on S&T Financial, Organizational Reforms 65
Letter by Chemical Researcher *[T. Bogacheva; SOVETSKAYA ROSSIYA, 19 June 88]* 65
Coworkers, Officials Respond *[A. Kalinichenko, N. Fokina; SOVETSKAYA ROSSIYA, 5 Aug 88]* .. 68
Blood Substitute Scandal Reveals Academy Internal Politics *[A. Ryskin; OGONEK, No 36, Sep 88]* 72

Pilot Experimental Bases, Effectiveness of S&T Potential

18140034 Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 7, Jul 88 (manuscript received 22 Dec 86) pp 24-31

[Article by A.V. Abeltin, the Institute of Economics of the Latvian SSR Academy of Sciences: "The Role of Pilot Experimental Basis in Increasing the Effectiveness of the Scientific and Technical Potential"]

[Text] The tasks of the intensification of social production are being accomplished and to a greater and greater extent should be accomplished on the basis of the integration of science and production.

At the 27th CPSU Congress it was stressed: "a vital task is to strengthen the contact of science and production, to develop such forms of the integration of science, technology, and production, which will ensure the efficient and prompt passage of scientific ideas from generation to extensive application in practice."[1]

The harmonious development of all the stages of the "science-production" cycle is necessary for the acceleration of scientific and technical progress. The inefficient, slowed down functioning of any of them can hinder the introduction of scientific achievements in production.

The speeding up of the introduction of scientific achievements in production in many respects depends on the state and the effectiveness of the use of pilot experimental works, which are intended for the preparation of the results of scientific research and development for practical use in various sectors of the national economy. Thus far this link is one of the weakest in the chain, which connects science with production.

Under present conditions the majority of the research and development in the area of new materials and technological processes, as well as equipment, instruments, machines, and mechanisms cannot be conducted at all, if the corresponding experimental base is lacking. The reliability of the obtained results and the degree of their readiness for industrial introduction to a significant degree depend on the level of equipment of the bases and on the methods of the organization of work. The time of the performance of much scientific research work is even more dependent on the efficiency of the activity of pilot experimental bases (OEB's).

All the foregoing also determined the goal of this article: the analysis of the role and place of pilot experimental bases in the "science-production" cycle and the means of increasing the effectiveness of their functioning.

At present in the USSR there are about 4,000 pilot experimental bases of scientific institutions (including higher educational institutions) with a total of about 700,000 workers.[2] These pilot experimental bases consist of a large number of enterprises or subdivisions, which are diverse in structure, capacity, the directions of activity, the conditions of planning, financing, and the remuneration of labor, and legal status. A significant number of pilot-scale, experimental, and semi-industrial units, plants, and shops operate directly at industrial enterprises and in associations.

The pilot experimental enterprises of scientific institutions are large subdivisions. The average number of employees in 1 pilot subdivision of a scientific institution comes to 254, while at pilot plants it comes to 427, at the same time the average number of employees in the pilot subdivisions of enterprises comes to about 50,[3] for the Latvian SSR this figure is even lower and on the average is about 30.

The pilot experimental bases of production associations and industrial enterprises are subdivisions, which are separate from series production and are intended for the improvement of the output being produced and the technology of its manufacture without radical changes in either. Only pilot operations are included in their functions, while the corresponding production subdivisions produce series, even small ones.

In spite of the existing differences between pilot experimental enterprises they all perform the following basic tasks:

- the preparation of the results of scientific research and development for practical use;
- the production and testing of prototypes and other specimens (batches) of new products, the pilot development of advanced technological processes for their assimilation and introduction in production and for the increase of the efficiency and quality of new equipment and technology;
- participation in contract-supervision and start-up and adjustment work, as well as in the designer's supervision and the technical preparation of production for the assimilation and introduction of new products;
- the making of mockups, stands, units, and special technological and testing equipment, the production of the necessary items, the performance of work and the rendering of services, which are connected with scientific research, development, the devising, assimilation, and introduction of new products, technologies, and others.

Moreover, the pilot experimental bases of scientific research organizations produce small series of products, the pilot operations on which have been completed. The output of small series at pilot experimental bases is permissible and efficient only if the necessary and an adequate amount and the reliability of the results of pilot operations are ensured. In those cases, when pilot operations are performed in the full amount, with their prescribed quality, and with the availability of a reserve of time, the production of small series of products can be

efficient due to the use of a pilot works as a series-producing works instead of the establishment of the latter in industry in case of a limited need for the corresponding products; due to the temporary use of a pilot works as a series-producing works up to the moment of the establishment and assimilation of the latter in industry. The research of V.A. Shakin and G.P. Grishina[4] showed that a pilot enterprise cannot produce more than 50 percent of the small-series products out of the total amount of work, otherwise it turns into an ordinary industrial enterprise, while only formally being called a pilot enterprise.

The development of pilot experimental bases of the Latvian SSR is closely connected with the directions of development of scientific research and with the development of the entire national economy of the republic, being a component of it. In the Latvian SSR the rapid development of those sectors, which will make it possible to increase the role of the republic in the unified national economic complex of the USSR, is envisaged for the 12th Five-Year Plan and for the future. Among such sectors are first of all the science-intensive, but low materials-consuming and low energy-consuming sectors of industry—instrument making and the electronics industry, the production of communications equipment, the chemical and pharmaceutical industry, the sectors based on biotechnology, and the forestry engineering, pulp, and paper industry.

The basic directions of development of scientific research: in the area of chemistry, the chemical industry, the timber, pulp and paper, and wood processing industry, power engineering, the plasma chemistry of inorganic compounds, the development of new advanced chemical technologies, the development of new drugs, and others, also stem from such a specialization of the national economy of the republic. The development of scientific research in these specific directions in turn also dictates the necessity of the establishment and development of the corresponding pilot experimental base.

The development of the pilot experimental base of the republic found its reflection in the scientific and technical program "The Development of Experimental Bases of the Latvian SSR." The majority of measures on the development of the pilot experimental base are aimed at the speeding up of the introduction of completed developments in production, at the improvement of their quality, at the increase of the output of test runs of items, and so forth, which in the end leads to the increase of production efficiency in the corresponding sectors of the national economy. It must be noted that the scientific institutions of the republic are still inadequately provided with pilot experimental bases, only about one-fifth of the scientific institutions have their own experimental base. Of scientific institutions the Latvian SSR Academy of Sciences, the Latvian State University imeni P. Stuchka, scientific research institutes of the agricultural type, and a number of other organizations have the largest pilot experimental base.

A number of important measures have been outlined in the development of the pilot experimental base of the Academy of Sciences. The construction of a complex of biological tests with a nursery of test animals is one of them. The implementation of the program on the construction of the complex, as well as its provision with scientific apparatus and equipment for technology will ensure the development of no less than 18-20 new preparations for medicine and agriculture a year.

A number of important measures on the speeding up of the introduction of new materials in the national economy (the Institute of Solid-State Physics of the Latvian State University), the broadening of the area of use of computer hardware in the national economy (the Computer Center of the Latvian State University), and the broadening of the scale of use of computer-aided design systems (SAPR's) in the republic (Riga Polytechnical Institute imeni A. Pelshe) are envisaged in the development of the pilot experimental base of higher educational institutions. The construction of the InterVUZ Center of the Servicing of Scientific Research of Higher Educational Institutions of the Republic on the basis of Riga Polytechnical Institute is also envisaged for the purpose of increasing the effectiveness of the scientific research work of higher educational institutions.

Considerable work, which is of great importance for the development of the national economy of the republic, is being performed at the Silava Scientific Production Association of the Latvian SSR Ministry of the Forestry and Timber Industry, where the questions of the complete use of all the biomass of wood, the development of industrial methods of reforestation, the increase of the productivity of forests, the improvement of the ecological and recreational functions of the forest, the production of hydraulic manipulators for the mechanization of loading and unloading operations in forestry, and a number of others are being elaborated.

The measures on the development of the pilot experimental base of the Latvian SSR Ministry of Light Industry are aimed at the accomplishment of several important tasks: the reduction of the use of manual labor at enterprises of the sector, the complete supply of enterprises of the sector with nonstandard means of mechanization, nonstandard equipment, and so forth, as well as the more complete meeting of the consumer demand for fabrics of especially fashionable structures.

The development of the pilot experimental base of the scientific production association of the Latvian SSR State Agroindustrial Committee is aimed mainly at the strengthening of the material and technical base, which is necessary for the fulfillment of the tasks that have been set for it.

The pilot experimental bases of many ministries and departments of the republic in their work are closely connected with the scientific research work that is being performed: they produce prototypes of new items,

develop technology, and bring it up to the level of the demands that are made by series production. Among such bases are the pilot experimental bases of the Latvian SSR Academy of Sciences, the Ministry of Higher and Secondary Specialized Education, the Ministry of the Forestry and Timber Industry, the State Committee for Construction Affairs, and others. However, a number of ministries and departments are using their pilot experimental base mainly only for the production of nonstandard equipment, including in small batches, and constantly repeated objects. The production of nonstandard equipment at the pilot experimental bases of ministries and departments is entirely permissible, but it cannot be their only or prevailing function, the work on the production of prototypes or batches of instruments, equipment, and so forth, which have been developed on the basis of the results of scientific research, and their testing and bringing up of series production should be the basis.

In the successful fulfillment of the tasks facing pilot experimental bases there are a number of difficulties which are connected first of all with the fact that the conditions of their economic activity are not equal to the goals and tasks that face them. The basic contradiction here consists in the fact that in practice the planning of the management and economic activity of the majority of pilot experimental bases, which are subordinate to scientific research institutes, but have an independent balance sheet and the rights of a legal entity, is carried out in accordance with the same regulations and indicators as the activity of ordinary industrial enterprises is. This circumstance leads already at the stage of planning to the replacement of the basic goals of the activity of the pilot experimental base and to the emergence of conflicts between the scientific research organization and the plant that is subordinate to it.

The Statute on the Pilot (Experimental) Enterprise, which was approved by Decree No 59 of the USSR State Committee for Science and Technology of 17 February 1984, can play an important role in improving the work of pilot experimental bases. This statute specified for the first time the organizational legal status of a number of types of pilot production and their rights and duties, having distinguished pilot enterprises from the mass of plants that produce series output. The changes in the rights and duties of enterprises, which are recorded in the decrees of the government and laws, which were adopted after the appearance of the Statute on the State Enterprise and the statutes on production and scientific production associations, were also taken into account in it.

A number of peculiarities, which distinguish the work of these enterprises from production and scientific production enterprises and associations, are singled out in the Statute. Thus, for example, there is no mention of labor productivity and the decrease of the production cost as goals of the activity of pilot enterprises, as well as the planning of the profit, the fee for capital, and other categories, which are used in the system of management of industrial enterprises. The fact that the pilot enterprise should have a plan of pilot experimental work, and not a plan on the output of commodity production, is one of the main peculiarities.

However, in practice the changes, which are reflected in the Statute on the Pilot (Experimental) Enterprise, are still not being taken into account. Since the system of planning does not take into account the specific peculiarities of pilot production, these enterprises often find themselves under conditions, when the evaluation indicators worsen. For the assurance of the fulfillment of the plan indicators, by means of which the evaluation of the results of activity is carried out and on the fulfillment of which the level of the wage of personnel depends, pilot experimental enterprises are forced to increase the volume of production of simpler products, which are not connected with research activity, by decreasing the amount of work for the scientific research organization. Due to the direct carrying over of the methods of planning labor productivity, which are used for industrial enterprises, the tendency for the number of personnel at pilot enterprises to decrease is being observed. As an example it is possible to cite the Experimental Electronic Machinery Plant of the Institute of Physics and Power Engineering of the Latvian SSR Academy of Sciences, where the use of these indicators led to a substantial decrease of the number of workers (during the period from 1966 to 1984 by 62 percent). Owing to these circumstances the design base, the strengthening of which is also impossible due to the adopted system of the planning of the technical and economic indicators of the plant, became extremely unsatisfactory for the experimental enterprise. All this led to substantial difficulty in the quick and efficient preparation of proposals of scientific laboratories for use in the national economy.

There is another complication in the formation of staffs of workers and engineering and technical personnel at pilot experimental enterprises. It is connected with the fact that, as a rule, due to the comparatively small size of pilot works they are assigned to lower groups in the remuneration of labor than large industrial enterprises of the same sector, which contributes to the drain of the most valuable highly skilled personnel from pilot experimental works. Although the complexity and uniqueness of their output and the high demands on the quality of items also require the high skill of personnel. Thus, for example, at the Experimental Plant of Biochemical Preparations of the Institute of Biology of the Latvian SSR Academy of Sciences the average wage comes to 70-90 percent of the average wage of workers at related enterprises. Some broadening of the rights in the area of labor and wages is envisaged in the already mentioned Statute on the Pilot Enterprise. However, taking into account the specific nature of the labor of the workers of pilot enterprises and the creative, research nature of their activity, it is possible to raise the question of a special system of the remuneration of the labor of the workers of these enterprises, which reflects the degree of novelty and complexity of the work performed by them.

The successful fulfillment of the tasks facing pilot enterprises is also being hindered by the fact that they are fitted out with obsolete equipment. Thus, for the Latvian SSR Academy of Sciences the equipment with a service life of more than 10 years comes to 17 percent, for the Ministry of the Forestry and Timber Industry—23 percent, and so forth. As a whole the installed equipment of pilot experimental bases is broken down by age as follows: up to 5 years—39 percent, 5-10 years—36 percent, over 10 years—25 percent. Moreover, testing equipment, both domestic and imported, and measuring equipment are often dispersed among a large number of organizations, enterprises, and institutions. Instead of powerful, specialized, industrially organized bases a large number of departmental subdivisions with very limited possibilities are often established. Therefore, it seems expedient to concentrate a significant portion of such equipment and instruments at specialized interdepartmental organizations and to concentrate the designing and production of the necessary equipment and machinery at a limited number of large specialized enterprises.

The adverse situation with equipment at pilot experimental bases is also noted by other authors. Thus, for example, I.S. Nayashkov writes that from a sample survey of a number of pilot plants attached to sectorial scientific research institutes it came to light that the age of equipment exceeds 10 years, moreover, the rate of replacement does not exceed 2-3 percent a year.[5] Even at the Ukrainian SSR Academy of Sciences, the management of which is devoting constant attention to the expansion and modernization of pilot enterprises, a significant number of machine tools and machines are worn out and obsolete. For example, at the experimental works of the Institute of Mechanics and the Institute of Technical Thermal Physics the share of worn out equipment back several years ago came to about 70-80 percent of all the equipment. At the institutes of the Belorussian SSR Academy of Sciences from one-fourth to one-third of the stock of instruments is more than 15 years old.[6]

All the above-cited data testify that the situation with the equipment of the pilot experimental bases of scientific institutions (of the Latvian SSR and other union republics) is still far from satisfactory. The situation with the production premises of the pilot experimental bases of scientific institutions of many ministries and departments of the republic is also unsatisfactory. In particular, the pilot experimental bases of the Latvian SSR Ministry of Light Industry are located in unadapted premises, which are little suited for this type of production, in their area and conditions they do not conform to the nature and necessary volume of production. A similar situation also formed at a number of pilot experimental bases of other scientific institutions. This is having the result that the introduction of new equipment is being delayed and there is no possibility of the qualitative modification of prototypes for their transfer to production. Thus, for example, at the special design and technological bureau of the Institute of Inorganic Chemistry of the Latvian SSR Academy of Sciences the fulfillment of the tasks on the optimization of technological processes, the development of nonstandard equipment of inorganic materials and apparatus for technological purposes, and the output of experimental batches of refractory compounds has been made extremely difficult. Taking into account the necessity of increasing the output of test runs of finely dispersed refractory compounds, the establishment of a modern experimental base for the special design and technological bureau is necessary. By now the majority of special design and technological bureaus and experimental enterprises of the institutes of the Latvian SSR Academy of Sciences need radical retooling, especially the experimental bases of the Physical and Technical Sciences Department.

As practical experience shows, many shortcomings also exist in the construction of pilot experimental bases: the plan of construction is being fulfilled unsatisfactorily, the percentage of its fulfillment in various sectors of the national economy is significantly lower than for construction as a whole. According to the data of several authors,[7] the plan of the construction of pilot bases is being fulfilled by 75-80 percent with respect to capital investments, while with respect to their placement into operation the percent fulfillment is even lower. For the Latvian SSR Academy of Sciences the fulfillment of the plan of construction and installation work on facilities of the experimental base during the five-year plans was at the level of 60 percent. Thus, even if capital investments have been allocated for the establishment of pilot experimental bases, it is necessary to solve the problem of their assimilation. It would be advisable to single out the establishment of pilot experimental bases in the plans of capital construction by a separate line. Moreover, in our opinion, it is necessary to introduce in the five-year plan the independent section "the construction of pilot-scale installations and works," with the corresponding assignments for ministries and departments. The inclusion of a list of pilot facilities in the state plan not only will make their construction mandatory for completion, but will also make it possible to solve the problems of material supply.

According to the data of several authors,[8] at present the annual capital investments in the expansion of the experimental bases of scientific organizations come to less than 1 percent of the annual amount of capital expenditures in the sectors of industry. Here a large number of scientific institutions do not have the necessary experimental base. The analysis shows that for the assurance of the continuity of the conducting of research and development the expenditures on the establishment of pilot experimental bases and their supply with instruments and equipment should be increased by three- to fourfold (subject to the specific sectorial nature). Such a growth rate of capital investments will not have a substantial effect on the total amount of expenditures on the development of the national economy, inasmuch as the share of material and technical supply of scientific research comes to less than 2 percent in the total volume

of supply of the national economy. According to the data of the Plan of the Development and Distribution of Institutions of Science and Scientific Service of the Sector of the National Economy "Science and Scientific Service" of the Latvian SSR it is proposed to use about half of all the capital investments, which are being allocated for the development of the sector, for the development of its pilot experimental base.

The question of material and technical supply is also grouped with the questions that have thus far not been settled, although at present serious discrepancies exist between the established practice of drawing up applications for equipment and materials and the peculiarities of the sphere of science and scientific service, including pilot experimental bases. Given the exist system, when it is necessary to submit the applications for equipment and materials 1-1.5 years prior to their use, the slightest miscalculation in determining the future needs leads to large losses: the entire "science-production" cycle and technical progress in the sectors of the national economy slow down. The planning of the need for materials, instruments, and equipment in such a time is entirely unjustified, inasmuch as no one can determine the needs accurately enough either with respect to the range or with respect to the quantity. Thus, the attempt at the organization of the systematic supply of instruments and materials, which is not backed by sound deadlines of the drawing up of applications, turns into spontaneity: direct ties with the producers of the necessary products are established for meeting the needs which have arisen. The inefficiency of the system of planned material and technical supply is giving rise to another problem: the desire to insure oneself against possible short deliveries and unexpected needs, therefore, the accumulation of excessive stocks of physical assets is occurring. As a result physical assets worth tens and hundreds of thousands of rubles are being withdrawn from circulation and are being frozen, the efficiency of the use of pilot experimental bases is decreasing. Another adverse thing is the fact that supply is carried out strictly in conformity with the norms of shipment, while this is having the result that it is not always possible to obtain the necessary assortment of materials, inasmuch as the need for them is often significantly less than the established shipping minimum.

In case of the organization of the material and technical supply of science and scientific service it is necessary to take into account a number of things: the uncertainty of the plan of deliveries (what is meant is, on the one hand, the probability of the emergence during research work of a need for materials, which was not previously foreseen, and, on the other hand, the disappearance of the need for previously ordered materials, instruments, and equipment); the need for a large range of very small deliveries both of materials and of purchased items; the lack of standards for the need for materials when conducting research.

The fulfillment of the following principles with respect to the improvement of the economic mechanism of this type of production would make it possible to overcome the negative trends that are hindering the efficiency activity of pilot works.

1. The changeover of pilot experimental enterprises of scientific institutions to the planning and evaluation of their activity in accordance with the sector "Science and Scientific Service."

2. The taking of the indicator of the fulfillment of the plan on the amount of pilot experimental work, and not the fulfillment of the plan on the output of commodity production as the main evaluation indicator of the results of the activity of pilot works.

3. The granting to scientific institutions of the right to plan the production volume and the utilization of the production capacities of the pilot experimental base (with the participation of the management of the pilot experimental base).

4. The taking of additional steps on the improvement of material stimulation and cost accounting at pilot experimental bases, including preferential conditions of financing and lending, material and technical supply, the remuneration of and the giving of bonuses for labor.

5. The increase of the interaction and mutual responsibility of scientific organizations, pilot experimental enterprises, and series-producing plants on the basis of trilateral economic contracts. To envisage within these contracts the broadening of the rights of pilot experimental bases when formulating the thematic plans of the scientific organization and when planning the preparation and assimilation of the production of innovations at series-producing enterprises.

Thus, the improvement of the economic mechanism of pilot experimental bases should include changes of the economic organizational conditions of all the directions of their activity and interrelations with scientific organizations and plants that produce series output.

The suggestion on the conclusion of trilateral economic contracts between scientific research institutes, pilot experimental bases, and series-producing enterprises presumes the following. It is necessary to draft this statute on the basis of the Model Contract for the Transfer by Enterprises and Organizations of Their Own Scientific and Technical Achievements to Other Enterprises and Organizations and on the Rendering of Assistance to Them in the Use of Borrowed Advanced Know-How. It is necessary for the regulation of the interrelations between the scientific organization, which developed the innovation, the experimental plant, which assimilated it, and the industrial enterprise, at which the new product will be series produced. In the statute it is necessary to stipulate the mutual rights and duties of all three parties with respect to technical, financial, and economic organizational questions. In the contract both the responsibility of each of its parties to each other for

the high-quality and timely fulfillment of the obligations assigned to it and their collective responsibility to the superior organization should be stipulated.

In the interrelations between the pilot enterprise and series-producing enterprises the financing by the latter of the expenditures on the preparation and assimilation of innovations at pilot enterprises, which it is then planned to transfer to them for assimilation in production, may become an important thing. Payments from the centralized funds of the corresponding ministry could become the source of the financial assets which are intended for these purposes.

The improvement of the economic mechanism of the activity of pilot experimental bases should have the result that innovations, which are developed by the scientific institution, will be assimilated in the optimum time and at the proper level and will be transferred in good time to industrial enterprises for series production; the needs of the scientific institution for nonstandard equipment, parts, accessories, and semifinished products for the conducting of scientific research will be met in good time; the amount of development on the assimilation of innovations, which is performed jointly with the scientific institution, will increase; the utilization of capacities will be regulated in good time, if there are capacities, which are free from the performance of pilot operations, work will be performed on the duplication of the assimilated product.

Footnotes

1. "Materialy XXVII syezda Kommunisticheskoy partii Sovetskogo Soyuza" [Materials of the 27th Congress of the Communist Party of the Soviet Union], Moscow, Politizdat, 1986, p 281.

2. "The Economic Effectiveness of the Activity of Scientific Organizations in Large Cities," "Problemy bolshikh gorodov" [The Problems of Large Cities], No 21, Moscow, 1985, p 4.

3. See Z.I. Kulikchi and E.M. Torf, "The Role and Place of Pilot Works in the Materialization of Scientific Results," "Organizatsionnyye formy svyazi nauki s proizvodstvom v promyshlennosti" [The Organizational Forms of the Connection of Science With Production in Industry], Moscow, Nauka, 1980, p 109.

4. See V.A. Shakin and G.P. Grishina, "The Peculiarities of the Economics of Pilot Plants, " "Upravleniye, ekonomika i organizatsiya opytnogo proizvodstva" [The Management, Economics, and Organization of Pilot Production], Moscow, 1977, pp 108-114.

5. I.S. Nayashkov, "Speed Up the Pace of Scientific and Technical Progress," VOPROSY IZOBRETATELSTVA, No 1, 1984, p 6.

6. V.A. Karelina, "Some Questions of the Analysis of the Technical Equipment of Scientific Research," "Voprosy upravleniya issledovaniyami i razrabotkami" [Questions of the Management of Research and Development], Minsk, 1979, p 140.

7. Yu.I. Berliner, "Vnedreniye nauchno-tekhnicheskikh razrabotok" [The Introduction of Scientific and Technical Developments], Moscow, 1985, p 53.

8. See "Upravleniye nauchno-tekhnicheskim progressom" [The Management of Scientific and Technical Progress], Moscow, 1982, p 50.

Costs Associated With Introduction of New Technology Discussed

18140041 Moscow PLANOVOYE KHOZYAYSTVO in Russian No 9, Sep 88 pp 55-63

[Article by Doctor of Economic Sciences Professor Z. Korovina under the rubric "Scientific and Technical Progress" (Donetsk): "Scientific Organization for the Assimilation of New Equipment"; second in an unspecified series of installments; for the first part, see PLANOVOYE KHOZYAYSTVO, No 7, Jul 88, pp 55-64]

[Text] Vast assets are being spent on the development and the introduction in production of new equipment. In 1986, 71 billion rubles of capital investments (on the basis of which fixed production capital in the amount of 62.2 billion rubles was placed into operation) were spent just on retooling, modernization, expansion, and new construction in industry, while 13.5 billion rubles were spent on the introduction of measures on new equipment. At the majority of enterprises studied by us in the past decade these expenditures exceeded the average annual value of the fixed capital, while the increase of the latter came to 69-87 percent. The volume of output increased one-fourth to one-half as quickly as the value of the fixed capital; labor productivity, the profit, and the profitability decreased at 36-50 percent of the enterprises. One of the main causes is the long time and enormous losses of the assimilation of new equipment, and first of all new works (shops and their aggregate), which were placed into operation by retooling, modernization, expansion, and new construction.

The actual time of the assimilation of the rated capacities of the electric steel smelting shop of the Donetsk Metallurgical Plant, the oxygen-converter shop of the Zhdanov Azovstal Combine, the trimming shop of the Gorlovka Machine Building Plant imeni S.M. Kirov, the complex of shop block No 1 of the Druzhkovka Machine Building Plant imeni 50-letiya Sovetskoy Ukrainy, and many other facilities, which were placed into operation during 1978-1980, exceeded 6-7 years instead of the 6-18 months in accordance with the approved norms.

The survey of more than 180 works and enterprises in different sectors of industry of the Ukraine, Siberia, and the European part of the RSFSR, which were placed into operation in the 1950's through 1980's, showed that the harm, which was done by dragging out the time of the assimilation of rated capacities (often it exceeds the standard time by three- to eightfold), reduces to naught the efficiency of the operation of even fundamentally new and economical equipment. Thus, at the Krasnoyarsk Tire Plant, which was commissioned in 1960, during the first 4 years of its operation the losses, which were incurred for this reason, came to 154 percent of the average annual value of the new fixed production capital. Due to the fact that the actual time of the assimilation of electric steel smelting shop No 2 of the Volgograd Krasnyy Oktyabr Metallurgical Plant, which was placed into operation in 1973, exceeded 7 years, the losses came to 13 percent of the average annual value of the fixed capital. The convert shop of the Yenakiyevo Metallurgical Plant and the open hearth shop of the Makeyevka Metallurgical Combine, which were put into operation in 1978, during the 6 years after modernization failed to provide 4 million tons of steel each, while the excess of the actual production cost over the rated production cost during these years came to more than 300 million rubles each.

The significant material losses during the period of the assimilation of a new or modernized works (on the average 30-50 percent and more of the average annual value of the introduced fixed capital) often turn a profitable enterprise into an unprofitable one. That is what happened at the Donetsk Metallurgical Plant, which due to the long time of the assimilation of the electric steel smelting shop for 4 years was unprofitable.

The lengthy and expensive assimilation of new works is due to the low quality of planning, construction, and installation work, miscalculations in technology and the design of machines, their low-quality production, the development and introduction of obsolete unreliable and uneconomical equipment, the incomplete placement of facilities into operation with a large number of flaws in workmanship, shortcomings in the organization of start-up and adjustment work, the shortage of skilled manpower, and the lack of raw materials, materials, and at times consumers of the output being produced. These causes, as a rule, are interconnected, which complicates their prevention at the final stage of the establishment of new works, that is, assimilation. They are associated with the low level of the organization of production and with the use of obsolete methods of management at all stages of the "science-technology-production" cycle, and first of all at the stage of the assimilation of innovations.

Consequently, a set of measures on the reform of the methods of organizing work both during the period of the assimilation of new equipment and during the periods adjacent to it, first of all the prestart-up and start-up periods, is needed. Radical changes in the interrelations of the enterprises, which are the producers and users of the equipment, with each other and with scientific research, planning and design, and construction and installation organizations are also necessary.

In economic literature and management practice they use the term "introduction" more often than "assimilation." Introduction is the process of implementing (materializing) discoveries, inventions, and scientific developments in specific new machines, technologies, materials, raw materials, and energy, which concludes with the production and use of new equipment. This is a broader concept, inasmuch as, in addition to assimilation, it includes a number of stages with respect to the development of innovations. Each of them in the content and nature of the performed work differs from the others and has specific peculiarities and drawbacks. At the different stages various organizations, which are often separated territorially and departmentally, perform the work. Thus, a contractor carries out the construction and installation work, a pilot plant of an institute often produces a prototype, a producer enterprise produces a trial run, and a user plant uses (operates) the new equipment.

Due to the heterogeneity and the different subordination of the participants in introduction common methods of the management of this entire complex process are impossible. Specific forms of them are required for each stage. That is why the assimilation of new equipment has been formed into an independent process for the purpose of developing sound methods of organization and management, which can be implemented by the specific industrial enterprise which is assimilating an innovation.

The components of the process of assimilating new equipment depend on its types, the purpose, the forms of introduction, the sectorial peculiarities of production, and other factors. Consequently, it is necessary to identify its content and structure and the peculiarities of implementation under various production conditions in interconnection with the process of developing innovations.

In most general terms it is possible to distinguish as combined units two forms of the introduction of new equipment, which determine the content, structure, and duration of assimilation. The first includes its production and use in operating shops. The second involves the introduction (and, accordingly, the assimilation) of innovations on the basis of new works, that is, individual shops and their aggregate, which were placed into operation by retooling, modernization, expansion, and new construction.

In case of the first form the processes of producing and using new equipment in operating shops are independent and are delimited with respect to the time and place of introduction. In case of the second form they are combined in time and space, that is, in the same shops that have been placed into operation. The analysis showed

that in this case assimilation is longest and most unprofitable. Taking into account the foregoing and the fact that the bulk of new equipment (83-97 percent) is introduced by the placement into operation and assimilation of new works on the basis of retooling, modernization, expansion, and new construction, precisely this process was taken for the analysis.

The necessity of the immediate solution of the problem of assimilating new works is due to three factors. The first consists in the fact that the shortcomings of all the preceding stages of the development and introduction of new equipment appear when assimilating new works, the long time and significant losses of which slow down drastically the pace of the acceleration of scientific and technical progress. The second is due to the shifting of the center of attention from the introduction of individual uncoordinated measures on new equipment to the retooling of the national economy on the basis of the rapid modernization of the production apparatus. The third factor is connected with the fact that when changing over to the new conditions of management the process of assimilation proved not to be affected by the economic methods of management. Meanwhile, any new shop and plant approaches normal operation after the very difficult period of eliminating start-up troubles, that is, after the period of the assimilation of the entire system of new machines.

Often all the shortcomings and oversights in the methods of management are explained by the static phenomena of the 1970's and early 1980's. But a long time and significant losses of assimilation were observed over the last 4 decades. New enterprises were assimilated significantly better during the first half of the 1930's. At that time exceptional attention was devoted to this problem. Many of the plants of those years were put into operation and achieved the rated capacities ahead of time. For example, the Kharkov Tractor Plant as a result of careful and comprehensive preparation for start-up exceeded and surpassed in the pace of assimilation analogous American enterprises.

Unfortunately, the positive experience of organizing the start-up of new projects was not used. The efforts of scientists of the 1960's and 1970's on the improvement of the organization and planning of the start-up and assimilation of new enterprises were also not embodied in economic practice. This is due not only to the lack of receptivity to innovations, but also to the profitability of a long time of assimilation and the obsolete methods of its organization, planning, evaluation, and stimulation.

At present the system of the economic management of the development and assimilation of new works and new equipment is not promoting a material interest in the end results of the "science-technology-production" processes, but is directing attention to partial and intermediate results. In particular, planning organizations for the most part are interested in turning the plan over to the client on time, in decreasing the estimating cost of construction, and in increasing the technical and economic level of planning solutions at the stage of their formulation, while construction and installation organizations are interested in placing the project into operation in the standard time. The latter is the only centrally planning indicator on new works and is monitored by superior and local management organs. Construction and installation organizations, whose bonus fund is formed from the estimated cost of a new project in case of its timely placement into operation, have a special material interest in this.

In order to keep to the standard time, construction workers often turn over projects incomplete, with flaws and a low quality of the performed work, that is, essentially not ready for operation. This became a system and was due to the confidence of contracting organizations that if the standard time of placement into operation arrived, the project would be accepted given any quality of it.

The aspiration to put a project into operation more rapidly is natural, but it should be combined with the complete attainment of all the design indicators and with the efficient operation of the new works. Unfortunately, in recent decades this has not been happening in practice.

Additional difficulties, which are connected with the elimination of flaws, incomplete placement into operation, and work performed with poor quality, arise when operating not completely finished facilities. However, production workers accept such facilities not only under the pressure of superior organs, but also because the inefficiency of the operation of new works often does not affect either the fulfillment of the plan or the amounts of the bonus. There is no separate system of the planning, evaluation, and stimulation of the work of collectives of new works. Immediately after acceptance the new facilities are including among the operating shops, and not the rated level of the indicators of the new works, which have been adjusted for the level of their assimilation, which is envisaged in the norms, as should be, but reduced indicators, which are due to the low quality of planning, construction, and installation work and to incomplete placement into operation, are incorporated in the plan for the enterprise.

The evaluation of the activity and the payment of bonuses to the collectives of new shops are carried out in accordance with the overall cost accounting indicators for the enterprise as a whole—"lumped together." And if the enterprise was able to substantiate the plan with reduced indicators for new works (and, as a rule, it succeeds in this), the workers of new shops receive bonuses in case of a long time of assimilation and considerable losses. Such a system continues to operate, in spite of the changeover to the new conditions of management and the suggestions of economics scholars on its change.

The reform of the methods of management, which affords opportunities for an economic interest in the end results of activity, is necessary in order to reduce the time and the losses from the assimilation of new works. In economic literature and management practice the calendar period of the placement into operation (acceptance) of a new facility, which is registered by a certificate of the State Acceptance Commission, is regarded without grounds as the end result of the development and introduction of new equipment, particularly by means of retooling, modernization, expansion, and new construction. Therefore, at present attention is being focused on the timely placement of new capacities into operation. Without belittling the significance of the latter, let us note that from the enormous expenditures on the development and introduction of new equipment society obtains the results stipulated in advance (the amount of specific use values and the impact) only after the achievement of all the rated technical and economic indicators, which should be established in terms of the most advanced equipment and technology, that is, after the completion of the process of assimilation, in the standard time which was approved in advance. Consequently, the end result of the work of not only new works, but also all the organizations, which are participating in the development and introduction of new equipment, is not its placement into operation, but the achievement by the new shop or their aggregate of the rated volume and the rated production cost of a unit of each type of product in physical terms as integrated and the most accurate indicators.

In spite of the Norms of the Duration and Level of Assimilation of Rated Capacities and Economic Indicators, which were approved by the USSR State Planning Committee, in economic practice they are often not used for the planning, the evaluation, and the payment of bonuses to the collectives of new works. Not only the prestart-up and start-up periods, but also the period of assimilation have as if fallen out of the "science-technology-production" cycle from the system of the organization of production and the management of the industrial enterprise. The exceptionally important problem of speeding up the assimilation of new equipment and new works thus far has not become even a topic of discussion in the press. And this means that, like before, after retooling, modernization, expansion, and new construction facilities, which are not ready for normal operation, slow the pace of the acceleration of scientific and technical progress, and decrease production efficiency, are being put into operation. According to our calculations, the losses from the exceeding of the time and expenditures of assimilation come to about 30 billion rubles a year.

A new approach to the economic methods of managing facilities, which are being placed into operation, is needed for the decrease of the time and losses of the assimilation of new works and, consequently, the acceleration of scientific and technical progress. The experience of leading enterprises convinces us that it is advisable to carry out independently and separately from operating works the planning, evaluation, and stimulation of new works, which have been put into operation by means of retooling, modernization, expansion, and new construction, over the entire standard period of their assimilation. The standard time and levels of assimilation of the rated capacity and the production cost of each type of product being produced should be included among the basic indicators of planning and evaluation. It is important to determine the planned volume of items and the production cost for each quarter by the adjustment of the rated volume and the rated production cost by a coefficient, which takes into account the standard time and level of assimilation of the corresponding indicators that have been approved by the USSR State Planning Committee for the corresponding sectors and works. It is necessary to plan and strictly monitor the observance of the calendar period of the assimilation of the rated indicators of facilities that have been placed into operation. It is necessary to approve them in the same way that the time of the placement of facilities into operation is now approved, and to include them in the projects (plans) of their preparation for production, start-up and adjustment work, and the assimilation of rated capacities (organizational projects), which should be drafted at the same time as the technical (technical working) project as an integral part of it.

Over the entire period of the assimilation of new works the activity of their collectives should be evaluated subject to the fulfillment and exceeding of the norms of the duration and level of assimilation of the rated indicators (the volume and the production cost) with a breakdown by quarters. It is necessary to pay bonuses to the collectives of facilities, which have been placed into operation, separately from old shops and quarterly for the fulfillment and exceeding of the standard time and level of assimilation of the product cost in case of the observance of the standard time and levels of the assimilation of the rated capacities. It is advisable to pay the bonus not in accordance with the overall indicators of the operation of the enterprise as a whole, as is done at present, but for its assimilation on time, with an additional payment for each percent reduction of the duration of this period, in conformity with the amount of the additional derived profit, once a quarter, in the amount of not less than 60 percent of the wage fund (on the basis of the average actual amount of bonuses at operating enterprises).

For the increase of the material interest of the managers of enterprises in the reduction of the time of assimilation and the losses from this it is important to form up to 50 percent of their bonus fund subject to the assimilation on time and ahead of time of the rated production cost of new works. Such a system of planning, evaluation, and the payment of bonuses will make it possible to create the economic prerequisites both for the rapid assimilation of new works and for the refusal to accept facilities not ready for normal operation with a low quality of planning, construction, and installation work.

Inasmuch as the output of a product with a previously stipulated (rated) volume and production cost is the end result of the establishment and assimilation of new works, it is necessary to interest scientific research, experimental design, planning, and construction and installation organizations materially in the quickest achievement of the volume of output, which is envisaged in the project, and its production cost, which can be achieved in case of a high quality of their operation. The omissions of these organizations should be identified during the start-up and adjustment work and be shown to the performers for the evaluation of the efficiency of their labor. It is important to devote particular attention to the quality of the projects, equipment, and its installation. Therefore, it is advisable to pay not less than 50 percent of the bonuses, which are now received by the collectives of the mentioned organizations after the drawing up of the project, after the completion of the start-up and adjustment work, when all the shortcomings of designing, the production of equipment, and its installation are identified, and with the consent of the enterprises, which are placing into operation and assimilating the new capacities.

The low quality of planning, construction, and installation work and the placement into operation of unfinished facilities with flaws are due not only to the insufficiently high skill of the designers, installers, and producers of equipment, but also to the fact they do not bear either material or moral responsibility for the end results, this do not affect their wage and bonuses.

The reform of the methods of the planning, evaluation, and stimulation of new works will yield an impact, if the preparation for start-up, start-up, and assimilation are accomplished in a well-founded time and at a high scientific organizational level. Consequently, it is necessary to separate these stages from the overall cycle of the vital activity of enterprises and shops, and sound methods of the organization of production, which determine the composition and content of the work, which is necessary for the efficient start-up and assimilation of new works, the means and time of its completion, and the performers, should be formed for them.

At present such work is performed without plans (projects) that have been thought out in advance, intuitively and on the basis of the experience of individual specialists, under the influence of immediate difficulties and tasks, often incompletely, and at a low organizational level. All this has a substantial influence on the lengthening of the time and the increase of the losses of the assimilation of rated capacities.

Depending on the content and the time of the implementation of measures on the organization of production it is possible to distinguish five periods in the life of any shop and plant: the prestart-up period, the period of start-up and adjustment work, the period of assimilation, the period of normal operation, and the period of the aging of tools of labor. Normal operation begins after the achievement by a new facility of all the rated technical and economic indicators. Methods of the organization of production and management have been developed and are being used for this period. The period of aging begins after such wear of the means of labor, when new modernization or retooling becomes inevitable due to the exceeding during the standard payback period of the assets and the total expenditures on the repair and maintenance of machines and equipment.

During the prestart-up period everything necessary for the efficient performance of the start-up and adjustment work and the assimilation of the rated capacities (the product cost) should be done in a strictly specified time. What is meant are: the monitoring of the quality and time of the production and delivery of equipment; its location, registration, and installation; the monitoring of the quality, the time and sequence, the completeness and cost of construction and installation work; the supply of spare parts; the verification of the availability of real suppliers of raw materials and consumers of the product; the supply of raw materials, materials, and power to the facility being placed into operation; the timely training or advanced training of personnel; the checking of the serviceability of machines and their adjustment. The prestart-up period coincides with the construction and installation work and ends at the moment of the start-up of the facility.

The management staff of the future plant and shops or the board of directors of the enterprise under construction should perform all the listed and many other functions. It is established on the condition of an approved detail design and the inclusion of the facility in the plan of capital construction. The duties, which are connected with the planning, monitoring, and cost of construction and installation work, are assigned mainly to it. The functions of the board of directors with respect to preparation for the start-up of facilities have not been elaborated in detail and often are performed in an untimely and incomplete manner (this especially pertains to new shops of operating enterprises which are being put into operation by means of expansion). Often the managers of new shops and works are appointed before the placement itself of the facilities into operation, and practically all the work of the prestart-up period is carried out jointly with start-up and assimilation.

The competitive selection of the future highly skilled experienced manager of a new works seems advisable at the stage of the arrival of equipment from the supply plants. He should participate in the formation of the management staff of the future shop or plant. His functions are the detailed study of the design documentation and the specification of the project (program) of the organization of preparation for start-up, start-up and adjustment work, and assimilation of the new capacities, as well as the monitoring of the quality and completeness of the construction and installation work and the arriving equipment and the thorough preparation of the facility for start-up.

The prestart-up period is not recognized and as if does not exist in either design or other documents. However, the prerequisites for the rapid and loss-free assimilation of new works (or vice versa) are formed precisely during this time. The preparation for start-up and the start-up of a facility are no less important than the construction and installation work.

The start-up period is also officially not recognized, not regulated, and not standardized. Meanwhile, not only in the 1930's, but also in the 1950's and early 1960's it did exist, inasmuch as each start-up complex (a shop, a section, an enterprise) was put into operation twice. The first time it was put into start-up and adjustment operation and the second time it was put into permanent operation. The length of this period—from the start-up of a specific section, which was registered by the working commission, to acceptance in permanent operation by the State Acceptance Commission—as a rule, came to 3 months. The system of machines was tested without a load, in neutral and working environments. The operators and installers participated in the start-up and adjustment work. During this work the shortcomings were identified and eliminated in order to accept for permanent operation a completely finished facility with the signing of the acceptance certificate for the crediting of bonuses to the construction and installation organization. At present after the completion of the construction and installation work they accept the facility immediately for permanent operation with many flows, as a rule, without being completed and without maintenance sections. As a consequence the operators with great difficulties and over many years eliminate the flaws. All this leads to a long time of assimilation and significant losses.

For the improvement of the organization of the start-up and assimilation of new works it is necessary first of all to restore the official status of the start-up and adjustment period and its standard time (3-6 months) so that all the shortcomings would be eliminated by the construction workers and installers prior to the start of the official placement of the new facility (start-up section) into permanent operation. Under such conditions the construction workers will be materially interested in the timely and high-quality completion of the work, otherwise they will not be paid a bonus.

The methods of start-up (by start-up complexes, individual shops, their parts, or an aggregate of shops), the structure of the complexes, the sequence and calendar time of start-up, and the means of carrying out the start-up and adjustment work, which have been substantiated in advance, are realized during the start-up and adjustment period. The last one includes testing without a load, the adjustment of the equipment, testing under a load, and the achievement during a calendar month of a specific level of the assimilation of the rated capacity, which has been substantiated in advance, with an output of products during the last month of the start-up period of not less than 60 percent of the rated capacity.

It is advisable to regard as assimilation the achievement of the rated volume in physical terms and the rated product cost by the facilities placed into permanent operation by means of retooling, modernization, expansion, or new construction. The calendar time of the placement of the facility into permanent operating from the day of the signing of the acceptance certificate by the State Acceptance Commission to the full calendar month, during which the rated capacity and production cost of a unit of output have been achieved, serves as the boundaries of assimilation. This period is officially recognized. Norms of the duration of assimilation have been developed and have been repeatedly approved for it by the USSR State Planning Committee. However, they are not used for the planning and evaluation of the activity of collectives of new works and the payment of bonuses to them.

The high-level organization of the assimilation of rated capacities is necessary in order to introduce the system of the payment of bonuses, the planning, and the evaluation of the functioning of new enterprises. The establishment of a list and the content of the jobs for rapid and loss-free assimilation, their performance in a specific time and in the necessary sequence, and the coordinated increase of the rated capacities in all the shops of basic and ancillary production with the use of the most suitable methods are meant.

The coordinated increase of the rated capacities should be carried out in accordance with a carefully drafted plan (organizational project) of assimilation, which encompasses the entire standard time with a breakdown by quarters. Planning by quarters is more acceptable for the achievement of stable technical and economic indicators. Here the methods of increasing the rated capacities are chosen and substantiated, the pace is calculated, and the time of assimilation for each start-up complex is specified.

By methods of assimilation there are understood the means of increasing the rated capacities, which depend on the type and sectorial peculiarities of production, the conditions of the supply of raw materials, materials, semifinished products, and power, and the provision with equipment repair. It is possible to distinguish two methods of assimilation: the rapid method and the gradual method. In case of the first the equipment from the very start operates at speeds and under conditions, which are close to the rated ones; its emergency failures, considerable losses from defective output, and the consumption of raw materials, semifinished products, steam, water, and electric power occur more often. In case of the second method the increase of the rated capacities occurs gradually, starting with the minimum speeds and conditions. Such a pace reduces the downtimes of equipment, the losses from defective output, and so on. Rough calculations for a number of enterprises show that in case of the gradual method the time of assimilation is somewhat longer than in case of the rapid method, but the expenditures are significantly less.

Experience confirms the necessity of the timely supply of new works with spare parts and high-quality raw materials and materials, since during assimilation individual parts and entire assemblies fail more often.

One should not identify the work during this period with normal operation, when all the rated technical and economic indicators have been achieved and the equipment is functioning stably. The basic goal of assimilation is the achievement of the rated technical and economic indicators and the bringing of equipment up to stable operation, which requires the high skill of maintenance personnel and specific methods of the organization of production.

The evaluation and planning of the actual time and costs of the assimilation of new works and new equipment, as was noted in our preceding article, should be reflected in a special form of statistical reporting. During the five-year plan it is necessary for each new works and individual new machines to compare the produced volume of output (in physical terms for each type of it) and the actual production cost by years of assimilation with the rated and actual level prior to retooling and modernization, as well as to compare the rate of assimilation of the indicators with their standard value.

The reform of the system of the management and organization of the preparation for start-up, start-up and adjustment work, and the assimilation of new facilities on the basis of plans and programs, which were formulated beforehand, will make it possible to reduce drastically the time and losses of the assimilation of new works.

The problem of assimilating specific types of new equipment in operating shops is of great importance for the acceleration of scientific and technical progress. It is especially urgent at enterprises of machine building. The time of the assimilation of new tools of labor comes to 3-8 years and more. It includes the period from the arrival at the enterprise of the technical specifications from the developing institute to the start of the output of the first industrial series. For example, for the 4PP-2C heading machine the period of assimilation of the prototype came to 3.25 years, while the expenditures on assimilation came to 247,700 rubles with a wholesale factory price of 91,100 rubles. The total period from the arrival of the working documentation at the plant to the start of industrial production is equal to 5.5 years, the industrial output during the first 3 years came to only two machines a year.

In case of the old system of management the significant expenditures on assimilation were recovered from the unified fund for the development of science and technology, while the expenditures on development were recovered from the budget. With the changeover to the new conditions enterprises will purchase from scientific research institutes their developments, and the expenses for the development of new equipment will be added to the expenditures on assimilation. They should be taken into account in the price of the new machine, which cannot exceed the price of the base equipment (P_b), which has been adjusted by the coefficient of the increase of its cost due to obsolescence (C_i) and the coefficient of the increase of the utility of the new machine as compared with the base machine (C_uUnder these conditions, so that the additional, one-time expenditures on the development and assimilation of new equipment ($E_{d.a.}$) would be recovered in the standard time (6-7 years), they should not exceed the value which is determined by the equation

$$E_{d.a.} = (P_b C_i C_u - P_b)Q,$$

where Q is the quantity of new machines, which will be produced during the standard payback period of the one-time investments.

Thus, the system of the organization and management of the development and assimilation of new equipment (in production and operation) requires further improvement and reform.

Marchuk on Competitive Financing for Academy Programs

18140074 Moscow IZVESTIYA in Russian
18 Nov 88 p 3

[Interview with President of the USSR Academy of Sciences Academician Guriy Ivanovich Marchuk by TASS correspondent A. Aladinskiy specially for IZVESTIYA: "The Idea—the Program—the Money. The Academy of Sciences Is Changing Over to the New System of Financing and Management"; date, place, and occasion not given; first paragraph is IZVESTIYA introduction]

[Text] In conformity with the decree of the USSR Council of Ministers the USSR Academy of Sciences, the Academies of Sciences of the union republics, and their scientific institutions starting on 1 January 1989 are changing over to the new system of financing and management. What is the essence of this system? President of the USSR Academy of Sciences Academician G.I. Marchuk tells about this.

[Answer] The essence consists in the fact that instead of financing the scientific institution as such, we are changing over to the financing of specific programs, projects, and themes. This will undoubtedly ensure the concentration, the focusing of financial, material and technical, and manpower resources in the most priority directions of research and will improve the integration of academic science both within the academy and on the scale of the country.

[Question] But who determines the priority?

[Answers] Suggestions were made by scientists. The Presidium of the Academy of Sciences, and then the general assembly, after discussing it, approved the set of programs.

A council made up of scientists of the USSR Academy of Sciences, the union republics, and industry and specialists in this field of knowledge was established for each of these programs. This, so to speak, is a certain prototype of the organ of the self-management of scientific research. A competition, in which any scientific institution and group of scientists can participate, is announced on the given theme, the program council, by enlisting experts as well, determines the winner of the competition and, hence, the participant in the program and distributes the resources that have been allocated for it.

[Question] What is the collective to do, if it prepared a long time and formulated its own version of the program, but failed the competition? Does it become bankrupt?

[Answer] Do you mean a scientific institute? This will not happen completely. I will explain in greater detail. In the structure of the academy there are 18 departments in specific directions of the sciences: mathematics, general physics, astronomy, biology, technical chemistry, and so on. Each department receives from the Presidium of the USSR Academy of Sciences budget assets for the formulation of programs of basic research. A portion of these assets, about 30 percent, is placed at the disposal of the institute for enterprising exploratory work, which is a reserve of future basic programs. This is the prerogative of the institute. Incidentally, the exploratory plan is also formulated on a competitive basis.

If you want to obtain assets of the state budget for conducting scientific research, suggest your own outstanding idea, that is, the best that you have. If you have an original one, you will receive money. And the academic institute will receive as many assets as the number of programs in which it is participating.

[Question] Hence, the scientific collective will not have to fear for its fate. While working indifferently, it is also possible to exist on 30 percent of the budgetary injections. For the sake of what is one to struggle then under the conditions of strict competitiveness?

[Answer] Well, if such a life suits someone, this all the same will not be able to continue for a long time. If it turns out that an institute is ineffective, naturally, the question of disbanding a portion of its subdivisions will be raised.

[Question] We have now spoken about budget allocations. It is well known that the scientific institutions of the USSR Academy of Sciences also perform a large amount of scientific research work that is of an applied nature. Are any changes being planned here?

[Answer] Yes. Up to now the performance of such work at the academy was simply not stimulated.

Today the situation is changing radically.

First, the interrelations of the academic institute and the client will be regulated through a system of contract prices. The profit, which has been derived from the performance of contract work after settlement with the state budget, will be used for the formation of two economic incentive funds: the material incentive fund and the fund for scientific, technical, and social development.

Second, the wage fund of the personnel of scientific research institutions of the academy, which until now was specified in absolute figures, now will be formed in accordance with a standard of the amount of work. I will stress: not the expenditures, as was previously customary, but the amount of performed work, inasmuch as in accordance with the new situation any scientific research work is in the end a commodity. Now any economic contract with an association and an enterprise, in addition to budget assets, will also yield an additional wage fund, which will make it possible through a system of

increments to give the scientist material incentives. Today all restrictions at scientific institutions with respect to the amounts of bonuses have also been lifted.

[Question] In connection with the introduction of the new system of financing do structural changes also apparently await the academy and its subdivisions?

[Answer] The size of the central staff of the USSR Academy of Sciences is being reduced by 30 percent. The consolidation of subdivisions will take place: instead of 47 there will 27 of them. Substantial changes also await the departments. The orientation will be more and more toward temporary special-purpose scientific collectives. They will be established in order to fulfill a specific program, and then either will be disbanded or will acquire the status of a basic subdivision. The scientific council of the institute will decide this.

[Question] Guriy Ivanovich, in the conversation you have been continually talking about elements of cost accounting. Does this mean that the academy will change over to full cost accounting?

[Answer] I believe that it is impossible to pose the question that way. We are introducing elements of cost accounting and self-financing and will develop them. But, all the same, basic research remains the main task of scientific institutions of the academy. We will not be able to find a client for it either at an association or in a ministry, therefore, the state is still the basic client. Hence, state budget financing will also remain.

[Question] I once had occasion to hear the complaint of the director of one scientific research institute that one has to spend the money, which was left at the end of the year, on the purchase of unnecessary general equipment. Life, he said, makes it incumbent, otherwise they will "cut" the allocations for the following year.

[Answer] It cannot be denied, such a thing also existed. If previously the budget assets were not used for some reasons, which at times did not depend on the institute: due to the failure to fulfill contract obligations, the failure to deliver the planned equipment, the failure of subcontractors to perform the work, hence, they were confiscated. To a certain extent this pushed institutions to spend the money by the end of the year at all costs. Now, in accordance with the new situation, the assets not spent this year are carried over to the following year. So that we no longer have such problems.

[Question] Not that much time remains before the start of work under the new conditions of management and self-financing. How will the changeover itself take place?

[Answer] The Presidium of the USSR Academy of Sciences in October of this year adopted a decree, in which it allocated the investments, which were received for 1989 from the state, to 500 institutes of the USSR Academy of Sciences and the academies of sciences of the union republics not by the old-fashioned means, but in accordance with the method, about which we were now speaking. Of course, this matter is unusual for our scientific institutions. We realize that a bumpy path, and not a beaten, wheel-worn rut, lies ahead, but the main thing is that the collectives of scientists have understood: in order to have money, it is necessary to earn it. We believe that during 1989-1990 this model will be finished and will yield a large impact in the use of the intellectual potential which the USSR Academy of Sciences has.

Procedures for Financing Scientific Research, Experimental Design Work

18140331a Moscow BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR in Russian No 5, May 88 pp 3-7

["Procedure for Financing Scientific Research and Experimental Design Work," approved by Decree of the USSR GKNT, USSR Gosplan and USSR Minfin on 30 December 1987, No 490/171/246]

[Text]

General Regulations

1. The Procedure for Financing Scientific Research and Experimental Design Work (henceforth referred to as the "Procedure") was drafted in accordance with the CPSU Central Committee and USSR Council of Ministers Resolution of 17 July 1987, No 817 "On Increasing the Role of the USSR State Committee for Science and Technology in Managing Scientific and Technical Progress in the Country" and with consideration of the CPSU Central Committee and USSR Council of Ministers Resolution of 30 September 1987, No 1102 "On the Conversion of Scientific Organizations to Full Cost-Accounting and Self-Financing."

2. The Procedure stipulates goal-oriented financing for the national economic and sectorial levels of scientific research and experimental design work, the distribution of allocations to science and scientific service from the state budget among the national economic complexes and development trends of science and technology with first-priority support of priority trends, as well as a methodology of determining the sizes of budget allocations for specific subjects of scientific research and development.

3. The Procedure applies to scientific research and experimental design work, being conducted by independent scientific research institutions, planning, design and technological organizations, by scientific organizations which are part of associations and enterprises, regardless of their economic management conditions (henceforth these will be referred to as "scientific organizations"), as well as by temporary scientific (scientific and technical) collectives.

4. At the republic level the procedure for financing scientific research and experimental design work is being drafted by the Councils of Ministers of corresponding union republics and is approved by them on agreement with the USSR State Committee on Science and Technology.

Financing Scientific Research and Experimental Design Work on the National Economic Level

5. USSR ministries and departments and the Councils of Ministers of union republics, on the basis of the Comprehensive Program for Scientific and Technical Progress in the USSR for 20 Years and concepts in the Basic Trends of Economic and Social Development of the USSR for 15 Years, submit proposals within the set time periods to the USSR State Committee on Science and Technology for the planned 5-year period (year), concerning the amount of state budget funds for conducting scientific research and experimental design work, according to the development trends of science and technology, including for implementing the assignments of state goal-oriented scientific and technical programs, for the Comprehensive Program for Scientific and Technical Progress of CEMA-Member Countries to the Year 2000, for the plans of inter-sectorial scientific and technical complexes, as well as for the fulfillment of work on inter-sectorial scientific and scientific and technical problems of state-wide significance, and for the creation of fundamentally new equipment which revolutionizes social production.

The financing of this work is implemented, as a rule, through the system of state orders for the development of science and technology. In this regard, allocations are designated which are needed to conduct basic research in the fields of social, natural and technical sciences, on the trends of scientific and technical development.

The head ministries and departments for the programs (problems) submit proposals concerning the amounts of state budget funds required to conduct scientific and technical and experimental design work on the whole, according to the program (problem).

6. The USSR State Committee for Science and Technology, with the participation of the USSR Academy of Sciences, head ministries, departments, inter-sectorial scientific and technical complexes, inter-sectorial scientific and technical councils under the USSR State Committee on Science and Technology and the USSR Academy of Sciences, scientific and expert councils, and, if necessary, organizations, enterprises and associations, evaluates the submitted proposals concerning the amount of state budget allocations. In this connection, the possibility of financing competitive projects, parallel work on the most important problems of scientific and technical development, as well as the initiative-minded work of individual scientific collectives and specialists, is taken into consideration.

The resources of centralized funds and reserves of ministries and departments, as well as of organizations, enterprises and associations with agreement by their labor collectives, is a source of financing for the work indicated in Point 5 up to the year 1990, along with state budget allocations.

Proposals on the amount of state budget allocations for financing basic research in the social, natural and technical sciences are determined by the USSR State Committee for Science and Technology, jointly with the USSR Academy of Sciences and the USSR Ministry of Higher and Secondary Specialized Education.

7. Proposals prepared by the USSR State Committee for Science and Technology concerning the volume of state budget allocations for conducting scientific research and experimental design work in the period being planned, with a division among the development trends of science and technology and the Committee's reserve, are submitted to the USSR Ministry of Finances and USSR Gosplan for agreement.

The USSR State Committee for Science and Technology, on the basis of the coordinated amount of state budget allocations, prepares and submits proposals for their distribution among the national economic complexes and scientific and technical development trends, as well as according to the size of the Committee's reserve for conducting scientific research and experimental design work, to the USSR Council of Ministers for approval.

8. In accordance with the USSR Council of Ministers-approved distribution of the allocations, stipulated by the USSR State Budget for scientific and technical and experimental design work, among the national economic complexes and scientific and technical development trends, the USSR State Committee on Science and Technology determines and approves, in the established procedure in the period being planned, the volumes of financing of USSR ministries and departments and the Councils of Ministers of union republics, for scientific research and experimental design work on scientific and technical development trends, with the delineation of the following priorities:

State goal-oriented scientific and technical programs;

The Comprehensive Program for Scientific and Technical Progress of CEMA-Member Countries to the Year 2000;

The work plans of inter-sectorial scientific and technical complexes;

Inter-sectorial scientific and scientific and technical problems of state-wide significance, and the creation of new equipment which revolutionizes social production;

Basic research in the social, natural and technical sciences.

According to the indicated priorities, the financing of scientific and technical and experimental design work on programs (problems), as a rule, is implemented through the head ministries and departments.

The USSR State Committee on Science and Technology maintains constant control over the rational use of the indicated state budget funds and, along with USSR ministries and departments and the Councils of Ministers of union republics, bears responsibility for their effective utilization. In the event that the designated state budget allocations are not utilized for the direct purpose, a decision is made on ceasing the financing of this work and the funds liberated in connection with this become part of the Committee's reserve.

9. USSR Gosplan, jointly with the USSR State Committee for Science and Technology, taking into consideration the amount of state budget funds set for the year being planned, determines the overall wage fund for the workers of scientific organizations which are part of the budget. The USSR State Committee for Science and Technology distributes the indicated wage fund among USSR ministries and departments of the non-production sphere and Councils of Ministers of union republics (among republic ministries and departments of the non-production sphere) and, jointly with USSR Gosplan, approves norms for them for forming a wage fund based on the volume of scientific research and experimental design work being conducted according to economic contracts, in the period until the end of the 5-year period, divided up by years.

10. For the timely solution of problems, related to carrying out the most important scientific research and experimental design work of state-wide significance, for which the need to conduct it arises in the course of the year, as well as for the development and acceleration of work to solve large inter-sectorial scientific and technical problems in creating fundamentally new equipment, technologies and materials, the USSR State Committee for Science and Technology uses the reserve on state budget allocations for scientific research and experimental design work.

Financing Scientific Research and Experimental Design Work at the Sectorial Level

11. The funds of associations, enterprises and organizations, as well as the resources of centralized funds, the reserves of ministries and departments and bank credit, and, when necessary, budget allocations, are sources of financing for scientific research and experimental design work in the industrial sectors of the national economy.

12. State budget allocations are one of the basic sources of financing for scientific research and experimental design work in ministries and departments of the non-production sphere.

Ministries and departments inform scientific organizations, that are part of the state budget, of the financial indicators for the overall volume of budget funds and the wage fund with distribution among the basic trends of scientific activity, including among the assignments for state goal-oriented scientific and technical programs, the Comprehensive Program for Scientific and Technical Progress of CEMA-Member Countries to the Year 2000, the plans of inter-sectorial scientific and technical complexes, inter-sectorial scientific and scientific and technical problems of state-wide significance, the creation of new equipment which revolutionizes social production, and basic research.

On the basis of these indicators, the scientific organization plans and accounts for expenses separately for each specific subject in accordance with the application.

The volume of scientific research and experimental design work, carried out by scientific organizations which are part of the state budget, according to contracts with institutions, organizations, enterprises and associations, is determined by them independently. The wage fund for this work is calculated according to the norm, established by the ministry and departments, from the volume of work carried out through its own forces.

Payment for the indicated work is made in the established procedure according to contract prices. On the basis of economic norms and indicators established by higher agencies, the ministries and departments approve the following economic norms for scientific organizations according to the indicated work:

Deductions from profits for the state (including local) budget (for scientific research sections and sectors of higher educational institutions, a norm is also stipulated for payment for labor resources in the amount of 300 rubles per staff worker);

Deductions from profits for the centralized funds of ministries and departments, as stipulated by law;

Formation of a fund for scientific and technical and social development;

Formation of a material incentives fund.

At the same time, the ministries and departments inform scientific organizations of the standards for forming a hard currency fund in the established procedure.

Scientific organizations can utilize the resources of the scientific and technical and social development fund for supplementary financing of basic research and other initiative-minded work of an exploratory nature.

13. Scientific organizations which have converted to full cost-accounting and self-financing implement the financing of scientific research and experimental design work in accordance with the CPSU Central Committee and USSR Council of Ministers Resolution of 30 September 1987, No 1102.

Determination of Budget Allocations for S&T Research

18140331b Moscow BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR in Russian No 5, May 88 p 7

[Supplement to the Procedure for Financing Scientific Research and Experimental Design Work, approved by a USSR GKNT, USSR Gosplan and USSR Minfin Decree on 30 December 1987, No 490/171/246: "The Determination of Amounts Designated from Budget Allocations for Specific Scientific Research Subjects"]

[Text] The expenses for each scientific research and experimental design work are planned on the basis of technical and economic calculations, the results of which are reflected in the calculation of budget cost on the whole according to subject, in the accompanying form No 1 (the forms are not given in BYULLETEN) and according to the work, subject to fulfillment within the year being planned, in the accompanying form No 2.

Expenses are subdivided into direct and overhead expenses, depending on the method for inclusion of scientific research and experimental design work in the cost.

All outlays directly related to the implementation of the subjects are direct expenses:

The wages of scientific, engineering and technical and other workers, working directly on the subject;

Outlays for materials, reagents, chemical preparations, etc., needed to fulfill a specific subject, as well as for transportation and procurement expenses;

Expenses for scientific business trips;

Outlays for the acquisition and manufacture of special equipment for scientific purposes;

Outlays for scientific research and experimental design work, carried out by outside organizations, enterprises and associations for the specific subject;

Other expenses, related to fulfilling a subject (outlays for conducting scientific expeditions, leasing of computer time, bonuses stipulated by USSR government resolutions, and others).

Expenses related to the implementation of certain subjects, to the management and organization of scientific research and experimental design work (expenses for maintaining the administrative apparatus, economic, and other), as well as the expenses of auxiliary economies and experimental design production, not part of the independent balance, which seem impossible to directly relate to a specific subject are overhead expenses. The absolute amount of planned overhead expenses for each subject is determined according to an approved percentage of the overhead expenses of the scientific organization for the wages of employees working directly on the subject. A system for the reciprocal coordination of direct and overhead expenses with the budget expenses of the scientific organization are given in accompanying form No 3.

The sum of planned outlays, according to the calculation clauses for scientific research and experimental design work included in the subject plans, is coordinated with the budget expenses for the scientific organization from the viewpoint of budget classification clauses.

Procedures for S&T Contract Work

18140331c Moscow BYULLETEN NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR in Russian No 5, May 88 pp 8-10

["Resolution on Contracts for the Creation (Transfer) of Scientific and Technical Production," approved by decree of the USSR State Committee for Science and Technology on 19 November 1987, No 435, as coordinated with USSR Gosplan, USSR Minfin, USSR Goskomtsen and USSR Gosarbitrazh]

[Text]

I. General Regulations

1. The effect of the Regulation applies to relations on the matter of creating and transferring scientific and technical production.

2. The procedure for concluding, executing, changing and canceling contracts for the creation and transfer of scientific and technical production is established by this Regulation.

3. Associations, enterprises, organizations, institutions, ministries and departments can act as a party in a contract.

The executor party in the contract can be only an association, enterprise, organization or institution, which has converted to full cost-accounting and self-financing.

4. The subject of the contract for the creation of scientific and technical production can be scientific research, planning, design and technological work, work on the manufacturing, testing and supply of experimental models and groups of items (production), and other work according to the work profile of the scientific organization.

Previously created scientific and technical production can be the subject of a contract for transfer.

Scientific and technical production relates to finished scientific research, planning, design and technological work and services, manufactured experimental models or experimental groups of items (production), fulfilled in accordance with requirements stipulated in the contract and accepted by the customer.

5. A contract can be concluded for the fulfillment of an entire set of work from research on up to introduction in industry of scientific and technical production, as well as its future technical assistance (service).

If scientific and technical production is the result of initiative-minded work, a contract is concluded for its transfer, including the rendering of services in its introduction and mastery.

6. The parties bear real responsibility for the fulfillment of obligations stipulated by the contract and by the documents accompanying it, which are part of the contract.

II. Contract Conditions

7. In contracts for the creation and transfer of scientific and technical production the following should be indicated (appendix No 1):

a) The names of the parties in the contract and their requisite mail, telegraph and bank information; b) The name of the scientific and technical production; c) Scientific, technical, social, economic and other requirements of the scientific and technical production which is the subject of the contract (the indicated requirements, on agreement by the parties, can be reflected in a technical assignment or document replacing it, which accompanies the contract (in accordance with the GOSTs)); d) The term of effect of the contract; e) The time period and procedure for surrendering and accepting scientific and technical production; f) The contract price; g) The procedure of payments for the transferred scientific and technical production; h) The rights of the parties to use and dispose of the scientific and technical production, created (transferred) according to this contract, not contradicting existing legislation; i) Conditions for the observation of confidentiality; j) The responsibility of the parties for violating the accepted obligations.

8. The following can be stipulated in a contract:

a) Conditions required for the introduction of scientific and technical production (rendering of services); b) The area of application, scales and volumes of introduction of scientific and technical production; c) The names of work stages and the time periods for their implementation; d) Conditions for material and technical support of the work; e) The right of the executor to keep that which is transferred to him by the customer, as well as the equipment, devices, instruments and materials acquired or manufactured for conducting the work, with compensation for their cost allowing for amortization or free of charge; f) Other conditions, which the parties deem it necessary to stipulate in the contract.

9. Amendments and changes to the contract should be officially noted in supplementary agreements to the contract.

III. Concluding a Contract

10. The draft contract, developed and signed by any of the contacting parties, is delivered to the other party. The delivery of a draft contract to a contractor is an offer to conclude a contract, effective within 20 days from the moment of dispatch.

11. Given the absence of objections to the conditions of the contract, the party which received the draft contract sends the other party a signed contract within the 20-day period.

12. Given the existence of disagreements on the draft contract, the parties take steps to settle them within a 10-day time period.

Given the existence of objections to the draft contract for the creation of scientific and technical production in conformity to a State Order for the development of science and technology, the party which has received the draft contract must inform the other party and its higher agency of the objections within a 10-day time period. Disagreements on such contracts are resolved by the parties' higher agencies.

13. By agreement of the parties, the contract may include:

A technical assignment or document replacing it (with offers for the preliminary price);

A calendar plan for the work (appendix No 2) (appendix No 2 is not given in the BYULLETEN);

The protocol of the Contract Price Agreement (appendix No 3);

An act of surrender-acceptance of scientific and technical production (appendix No 4).

IV. Payments for Scientific and Technical Production

14. Payments for scientific and technical production are carried out on the basis of the contract price with consideration of the implementation by the executor and the customer of contract obligations and in accordance with the time periods and sums of payments, stipulated by the contract conditions.

The contract price for scientific and technical production is established at the stage of conclusion of the contract and is not subject to change, except when an additional agreement is concluded.

As a basis for achieving an agreement on the contract price, a preliminary price is set, which is estimated by the customer (executor) with a consideration of the scientific and technical level, competitiveness, effectiveness, period of effective use and other factors for applying the scientific and technical production.

15. In the contract, the parties can stipulate a one-time payment for scientific and technical production within a time period established by them from the day of signing the act of surrender-acceptance or payment for scientific and technical production in the form of payments according to the coordinated time periods.

16. In the event that the implemented scientific and technical production includes various forms of it (a set of technical documentation for a new product, services in the mastery of its production, etc.), prices can be stipulated within the contract separately for each type of scientific and technical production.

17. Conditions for the advancing of work and payment for it are stipulated in the contract according to agreement by the parties.

V. Changing and Canceling Contracts

18. A contract is subject to change or cancellation, when the scientific, technical, economic or other requirements of the scientific and technical production have been changed by a decision, mandatory for both parties.

19. A contract can be changed or canceled by the agreement of the parties.

20. A party in a contract has the right to a unilateral procedure for canceling a contract, if the other party has violated the contract obligations.

VI. Responsibility of Parties, Resolution of Disputes

21. The parties bear responsibility under the conditions and within the procedure, established by existing legislation, for failure to fulfill obligations stipulated in the contract.

22. Contract disputes are to be resolved through the established legal procedure.

Economist Defends Law on Cooperatives for S&T Research

18140320 Moscow NTR: PROBLEMY I RESHENIYA in Russian No 12, 21 Jun-4 Jul 88 pp 5-6

[Article by O. Osipenko, candidate of economic sciences: "Sell the Engineer a Patent"]

[Text] Even after the Law "On the Cooperative in the USSR" was passed, many social leaders and practical workers continue to think that the "small economy" should assume a relatively modest place in our national economic complex. In several of its sectors, they assume, the spread of individually and collectively organized forms of economic management are notoriously unpromising. Most frequently, the scientific and technical sphere figures in their discussions as this forbidden corner of state property.

How is this viewpoint argued? Three reasons enjoy the greatest popularity among the opponents to small-scale economic forms in the sphere of scientific and technical progress. In the first place, design and technical tinkering, so they say, will inevitably undermine the scientific and technical policy of the sector and society. The cart, they say, will block the road—who is this good for? The second argument is the substantially resource-intensive nature of the scientific and technical economic sector. The skeptics ask enthusiasts, who have tired of struggling, in proving the obvious truth to scientific bureaucrats, with the monopoly of some "head SRI" [scientific research institute], what sort of "trifles" they will develop their research on? "You will not get an accelerator on the wages of a junior scientific associate!" The bugaboo of an exodus of talented scientists and engineers from the "big economy"—SRI laboratories and offices and VUZs—to the "small" (cooperative and individual labor activity), followed by the already quite horrifying prospect of "the country's loss of leading positions in the scientific and technical sphere," is given as the third reason.

In spite of the categorical tone of the tirades containing these "proofs" of the "small economy's" unpromising nature in the scientific and technical sphere, and, as a rule, the icy gaze accompanying this lecturing coming from the chief's desk, they can hardly convince anyone now. In particular, what does the term "unified scientific and technical policy" mean? Does the fact that the leaders of industrial ministries (whose boards it is long past time to reform into elected, exclusively coordinating agencies, personally represented by the directors of the largest enterprises in the sector) actively use this cliche to substantiate a need to preserve their privileged position, ranking above material production, not make one wary? If "unified" is used in this worn-out phrase as a synonym for "oneness," "monism," and such thick-skulled barracks-like unification, then this policy should be unconditionally rejected. Its results are already too impressive. Economists have calculated that, whereas in the 1960s the labor productivity of each new job site created in

industry exceeded the "base" (preceding) productivity by approximately by 65 percent, from 1981-1985 it exceeded by only by one-third. The "gods" to whom it is worth praying are neither ambitions nor considerations of preserving departmental monopoly, but flexibility, sober economic calculation and, in the final account, world leadership (alas, this is only a distant prospect for us).

If **unity** of scientific and technical policy refers to a unity of economically substantiated **principles** for research in science and technology, above all the recognition of the sensible combination of the development of promising, but expensive technologies with economic studies, which make it possible to successfully solve current problems in industry, as a fundamental idea, then the introduction of the "small economy" in the scientific and technical sphere is one of the ways to implement this policy. True, in this case one would be forced to acknowledge yet another bitter truth: attempts to find even a trace of such a scientific and technical policy in our most recent history are futile. A flexible strategy and tactics, defined by the scales of cost-accounting, has yet to turn up within the sphere of scientific and technical progress.

The second reason given by the supporters of scientific and technical centralism is somewhat more complex. Scientists and engineers—alone or as collectives of "techies"—really cannot get by without funds. It seems to me that pooling the modest earned savings of enthusiasts together into a common "pot," as a rule, does not solve the problems. Is this situation unsolvable? Hardly. I have already brought the readers' attention (see NTR No 9, 1988) to the first method for solving it. It is a question of scientific and technical cooperatives issuing bonds and the sale of these bonds to the population by the USSR Savings Bank. Unfortunately, the final text of the Law on the Cooperative (I am referring above all to article 22) does not say a word about bonds and the possibility of selling them to citizens who are not members of the cooperative. In our opinion, there is a need to make a corresponding amendment to this document.

Income from stocks, of course, should exceed the maximal income from the population's special-purpose investments. Moreover, there is no need to restrict this source of financing for one simple reason: scientific and technical cooperatives (NTK), which have already proven their effectiveness in practice, will enjoy the trust of the securities market investor (it is finally time to restore civic rights to this category as well). Consequently, the problem of the initial accumulation of funds remains.

Therefore, it is important with all definitiveness to indicate the second source: funds, which associations of small producers—organizations of individual workers and cooperatives, somewhat like a cooperative union or trade-house—will accumulate. Today they are being created everywhere for protection against "outside," primarily bureaucratic, infringements on the development of the "small economy" in the USSR. However, these "ministries," created "from below" and existing on volunteer contributions from the working people themselves (incidentally, this is a good model to imitate in the "big economy"), have even broader strategic tasks: performing expert analysis of the drafts of legislative nominative acts concerning the "small economy;" providing guarantees for social development in this sector of the economy (moral incentive for shock workers, development of a material base for leisure time, pension plans, payments in case of temporary inability to work for those engaged in individual labor activity as their main occupation, and so forth); cooperation in supplying raw materials and materials and in selling the ready-made production; advertisement; international contacts, etc. In short, associations of small producers should be concerned with all of the problems common to the "small economy."

Almost the most important of these problems is the very primitive equipment which individuals and cooperative workers are forced to work with today. It would hardly be a revelation to anyone that the latter must at times make do with either the simplest "home workshop" equipment or morally and physically obsolete tools, written off by state enterprises. Frequently, they also make do with the services of speculators. The preponderance of the latter source makes one particularly wary. Studies, conducted under the leadership of the author of this article, at the Riga Market in Moscow—a trade center for the output of individual labor activity—showed that only half of the individual workers use legal supply channels for their raw materials and materials.

Should one count on the fact that the "center" and the "big economy" will take the trouble to create a specialized machine building sector for the "small economy?" The snail crawls along, and someday it will... Meanwhile, it seems to me, there is a simple and elegant solution to the problem. Create a sector of group "A" enterprises for the "small economy" through the efforts of the "small economy" itself. Everyone knows that the Law on the Cooperative permits one to organize not only scientific and technical, but also machine building cooperatives. However, the former need money so that the latter can work. Let precisely the associations of small producers give funds to the scientists, engineers and designers who have joined a NTK. Meanwhile, the more profitable cooperatives which specialize, for instance, in different types of services for the population, will redistribute, in other words, part of their own incomes through "collective self-defense" agencies—cooperative councils and trade-houses—for the benefit of cooperatives, which (one would like to believe) will soon provide them with compact, highly efficient specialized equipment. Incidentally, not only is a permanent redistribution of funds possible, but so is ordinary credit. In this case, the creditor-cooperatives' incentives are doubled. It means both new equipment and a percentage of interest.

There is a third source. The cooperative worker's original scientific research institute could also become a creditor. Nonsense? Not at all. In some cases, it can be profitable for an institute, above all a sectorial institute, to grant an NTK unique commercial credit: to transfer laboratory equipment and the corresponding premises for use at night, in this connection having stipulated in a contract with it beforehand the lease payment and the percentage on the loan, according to the expiration of the term stated in the agreement. In this case, obviously, not only the "initial accumulation" problem is solved (it is compensated for by a loan in "barter form") but also the problem of acquiring the necessary and, alas, for the time being still extremely scarce equipment and premises. This is all the more important, since the Law on the Cooperative, regardless of observations voiced in the press regarding its draft, has not provided the cooperative workers any guarantees whatsoever in this area.

It is necessary to state that, following Hungary, a similar form of economic management is spreading in our industry as well. Initiative-minded toilers who work in state enterprise shops are forming cooperatives which use familiar equipment well during the evening shift. The profit is for society—an increase in the shift coefficient, and the fact that the physical obsolescence of equipment does not lag behind the moral; for the enterprise—the cooperative puts a solid lease payment into its till; and, of course, for the cooperative workers, who, by not making things hard on themselves by seeking equipment, are producing finished goods at commercial prices. Why not apply this form of economic management, which has already proven its effectiveness, to the scientific and technical sphere?

I would like to mention the skeptics' third fear—the forecast of a mass rush of scientists into the "small economy"—quite briefly. According to USSR Goskomstat data, in 1986 about 4 million specialists with diplomas did not work at jobs which require this level of training. Are the NTKs guilty of this? They simply did not exist at the time! Disillusionment with tediously "killing time" in a scientific research institute, combined with the "engineering standard" pay—the notorious "hundreds of rubles saved"—started long before the NTK, and was an easy target for satirists even in the 1970s. The overflow of labor resources (even presuming that it takes place for said reason) is hardly a spontaneous process, "undermining the planned nature of the national economy," as was recently thought, but an entirely natural manifestation which attests to the fact that the market (i.e., the user, in the final account) to a great extent needs the development of the "acceptor" sector ("small economy"), as well as the services of the "donor" sector (official scientific and technical structures). To struggle for a talented engineer one does not need shouts and administrative measures, but economic and creative incentives for his work. So, let the scientific research institute compete with the NTK. The country's economy can only profit from this rivalry.

Thus, there are essentially no serious arguments against developing the "small economy" in the sphere of scientific and technical progress (exhaustive criticism of the theory of an "inflationary spiral," which NTKs allegedly create, has already been published in a bulletin). However, have all legal obstacles been removed? Alas, no. Article 2 of the Law on Individual Labor Activity reads: "The existing Law shall not be applied to the creative activity of citizens in the sphere of science and technology..." But why? The lawyers explain: there are author's, patent and other areas of law, which fairly efficiently regulate the individual efforts of idea-generators. However, please excuse me, but legally "pinning down" first place in one or another field and applying one or another idea, even if it is not new, in practice is, after all, not the same thing. The existence of said sectors of law would not prevent, in particular, NTK or cost-accounting youth scientific and technical centers from developing their own activity, or prevent recognizing their sovereignty through a special nominative act. How come an individual engineering worker cannot be engaged in similar types of engineering and technical services? I am convinced that the "craftsman" is also fully capable of handling many orders, which exist in NTK "packages."

The legalization of individual labor activity in the scientific and technical area is on the agenda for other reasons as well.

The task of developing economic competition as an antidote to monopoly, stagnation and conservatism holds one of the central positions in the CPSU Central Committee Theses for the 19th Party Conference. Economic competition is, above all, an honest contest among three sectors of our economy, equal in terms of rights: state, cooperative, and individual-family. I emphasize: precisely equal in terms of rights! Without equal rights there will be no competitiveness. For the time being, the "chains" of prohibitions hang around the neck of the engineer who wants to acquire a patent. These must be cast off: the Law on Individual Labor Activity should be amended by resolutions which allow the individual to work on the orders of organizations and enterprises.

In conclusion, I would like to state that the parallelism, which frightens many, in the activity of scientific and technical organizations of different organizational types—academic institutes, sectorial scientific research institutes, the NTK, NTTM Centers, and in the future, evidently, "engineers with a patent" as well ("suddenly" everyone starts working on same things) is a temporary phenomenon. It is a unique kind of growing pain. Both scientific research institutes, cooperatives and individual workers will acquire "a face of their own" as the primary needs of interested organizations and enterprises for scientific and technical developments are satisfied. I am convinced that, under conditions of free competition, reasonable specialization will be ensured here as well.

S&T Progress, Redistribution of Manpower

18140332 Moscow IZOBRETATEL I RATSIONALIZATOR in Russian
No 5, May 88 pp 12-13

[Article by V. Kostakov, doctor of economic sciences, professor: "Cadre Shortage? Nothing of the Kind!"; first paragraph is IZOBRETATEL I RATSIONALIZATOR introduction]

[Text] Technical progress and increased labor productivity inevitably lead to a reduction in work time, to the liberation of workers and their redistribution among the economic sectors. These processes are difficult for society and man, and become even more difficult if they are not prepared for in advance. On the other hand, as the author thinks, today the existence of "extra" people in many industries is closing the path to new technology, making it impossible to realize its advantages.

Birth of a Myth

New equipment and progressive technology yield a significant economic effect. This, one would think, is an indisputable truth. However, what sort of miracles are there? The leading firms in their sectors have the most advanced equipment, purchased abroad, installed and neglected. We obtain no gain, and all of the significant economic indicators remain at approximately the same level, which both less-than-perfect equipment, as well as traditional technology ensure...

The secret is easily revealed. "There," where the purchased equipment has demonstrated its sensational capabilities, 25 people operate it: we have a personnel list of 250. There, for the same job where one worker is employed who combines several professional functions and conducts every minute of the work day with unremitting effort, we have a customary procedure, or more precisely, inculcated concepts of the normal work mode which force us to employ two and sometimes three people. Immediately, the expenses soar.

One of the more recent examples: an automated production line was introduced at a large plant with great efforts and corresponding hopes. Yet, labor productivity dropped. When this implausible situation had been studied in every detail, it became clear that the automated line uses only parts which are 100 percent to standard. It mercilessly rejects those with even the slightest defect, but manual assembly lacks this quality control. It brings to mind Arkadiy Raykin's sarcastic retort: "The machine is an idiot!"

No, I am not trying at all to call the possibilities of scientific and technical progress and the fruits of the creativity of engineers, designers and inventors into doubt. However, with every passing day we become more surely convinced that within a framework of obsolete and routine labor organization, overall laxity and lack of technological discipline, new equipment does not even slightly surpass our available equipment in terms of final results. This is like a bog that sucks in the most brilliant lights of engineering thinking and the most perfect creations of human hands and drowns them in its bottomless depths.

Let us examine this closely: what is happening here in the area of labor organization and use today?

In the last 15 years, our mass economic awareness has been living under the press of incessant discussions of the cadre shortage. Supposedly, the birthrate declined and now there is no one to work: this simplistic thought is heard in every possible variation, even at serious business meetings (including from the mouths of the greatest managers and scientists!), as well as in private conversations. Recently, a participant in the popular television show "Twelfth Floor", when it was a question of the urgent problems with housing construction for young people, stated with simple-minded certainty: it is very unsatisfactory, because the demographic situation is unfavorable!

Why is this myth so supernaturally tenacious? After all, one cannot say that information about the true state of affairs has not been circulated in all these 15 years. It has been stated in the press, in lectures, in specific figures, and in every possible debate. For example, the following: the time at which cadre problems first began to be felt did in fact coincide with a period of reduction in the birth rate. However, after all, newborn infants cannot replenish the army of workers! Whereas if one speaks of the increase in the working-age population, i.e., the main thing that determines the quantitative balance of labor resources, it was precisely in those years, at the turn and beginning of the 1970s, that it was at the maximum for all postwar decades. What, it would seem, could be more convincing! It attests to the fact that the economy is not suffering from a shortage of manpower. Conversely, in many places there is obviously more than needed. As far as the real cadre problems that we are encountering are concerned, when, let us assume, only two nannies are working in 13 groups at a kindergarten, or some buses cannot go out on the route because of a lack of drivers, then there are specific socioeconomic causes, which are not demographic at all and not a shortage of people... However, even this has not forced talk of a shortage to abate!

In such cases, one should try to understand: who needs this myth so badly and why?

When things are not going well, or not going as they should, the natural human need is to find some sort of independent outside factor beyond our control. Poor weather conditions, if it is a question of agriculture, or the chicanery of subcontracting plants, if it is a question of industry.

Much has changed in our life after the 27th CPSU Congress. However, the fact that talk of a cadre shortage, as if it were a kind of unfavorable given, is not ceasing, is symptomatic and alarming. It means that despite the steps which are being taken, there is no order in the utilization of labor. It means that it is now possible for an enterprise to feign poverty, to conceal its true capabilities, not to reveal but to hide its reserves ("can they demand much of us, if there is nobody to work!). It is unprofitable to fully exert one's forces, to display initiative and "take things upon oneself."

An industry leader, regardless of his rank, remains a figure on the defensive, leading the game "for reduction," in terms of his mentality and thinking and in the form of his actions. These are not errors, not the professional flaws of individual people, who can be replaced in the end. This is a mass phenomenon. There is another no less urgent aspect to the problem. We know what one of the most important features of the period 1986-2000 is: a significant growth in production volumes should be ensured, not only without increasing the number of workers, but even with a great reduction in the present number of employees—by 13-20 percent—and, in addition, the number of employees in the non-production sphere should be significantly increased.

What tremendous preparation, both organizational and psychological, this large-scale shift requires! In this regard, it is obvious that if the matter is considered beyond the limits of the present 5-year period, the preparation should already be being conducted now. Comprehensively well-considered ways, through which this displacement, unprecedented in the history of our society, this "overflow" of labor resources between spheres of labor application, will occur, should already be refined in plans, projects and preliminary development work today.

Meanwhile, however, no such projects or development work can be seen! On the contrary, in speaking with many planners, I encountered an inexplicable placidity. It is based entirely on this same myth about a cadre shortage. In fact, if we have unfilled vacancies everywhere, empty work places everywhere, is it worth being troubled or worried about where the workers, made unnecessary thanks to technological progress, will go? They will go, supposedly, to these unfilled places!

The Liberated Remain

The new economic thinking, able to ensure genuine restructuring in all areas of production and social life, does not lie in learning a certain number of concepts and formulations by rote. It presumes an ability to see reality and oneself within it in a new, unaccustomed foreshortening. In all but first priority, this relates to concepts about the norm for labor outlays, about how much a person can and, therefore, is obligated to do at his job and, consequently, how many workers in fact are needed to do one job or another. This is the main nerve of intensification. Having become accustomed, not from a good life, to such forms of labor organization, when it is in fact not principle-minded whether or not one or two people are assigned to one job or another, we have not taught ourselves to be impatient towards the overexpenditure of labor. With such organization, there is no need whatsoever to seek out and introduce inventions, since in the final account they lead to a reduction in workers. There is no need to re-evaluate the norms after introducing innovations, since one would then have to re-evaluate the personnel.

Here, mechanisms which should steadily decrease the number of employees in proportion to the increase of labor productivity, which should reveal specifically those without whom one can still manage, are not functioning.

Why do I speak of this with such alarm? Even in the 10th and 11th 5-year periods, there were all prerequisites for the process of reducing the number of workers in industry and in construction to appear at least just as obviously, as it had already occurred in agriculture for a long time. However, nothing of the sort is being observed! After all, many industrial spheres have already achieved a situation in which there is no need to increase volumes. The essence of progress now lies in reducing outlays, raising efficiency and sharply raising production quality.

The brigade contract and brigade form of labor organization is being introduced everywhere. For example, more than half of the entire volume of construction and repair work was done by contract brigades in 1985. How much has the new form of labor organization reduced the need for workers? We sought this kind of data in vain—there are none. Yet, after all, the "spirit" of the brigade method should have been precisely this—in working more productively, due to high inner discipline and rationalizer activity, it makes do with a smaller staff, but to make up for things it obtains an opportunity to raise earnings by those of the one who, in fact, is unnecessary. Leading workers are complaining: the brigade lacks the right to solve the question of its own numbers and distribution of earnings. The result: in construction, as accounts show, about 3 million people, i.e., approximately a third, are being maintained beyond that which is needed today.

Cadre excesses are also quite considerable in the most skilled labor spheres. The following figures give an idea of their scale. We have twice as many certified engineers as the United States, but our labor productivity in industry is lower by a factor of almost 2.

Economic experiments are opening a road to widespread cost-accounting, self-support and self-financing. However, until it is finally understood and interpreted, what sorts of serious changes should be endured in this connection by the entire existing practice of labor planning and utilization? For example, to this day it is not entirely clear precisely how enterprises, which do not yield the necessary preponderance of profits over expenses, will be

eliminated, yet, alas, there is no doubt that this will prove to be. If we begin to support the bankrupt ones, to nourish them with subsidies, taking some of the profits from the best ones for these purposes, what kind of cost-accounting will this be? This is social security!

The principle of self-support is a cruel principle. However, it is also fair: it reveals the essence and sorts out who is capable of what. It also, in forcing us to achieve real results, instead of results for show, will unquestionably create very real incentives for the utmost reduction in number of personnel, for paying wages only to those without whom it is in fact impossible to make do.

This process will not be easy or painless. However, it will probably be even more serious and fraught with complications, if we do not prove to be ready with a well-considered, thoroughly debugged mechanics for the liberation and redistribution of cadres. This should include an information system which enables a person to rapidly and precisely orient himself with respect to where and under what conditions it is possible for him to find a use for his efforts, knowledge and experience, and a system of educational centers. After all, many will be faced with a need both to finish their studies and to re-educate themselves, in adapting themselves to industry's new demands. The legal position of workers should be clearly defined in this difficult period for them. The enterprise administration should be freed of concerns about where, how and in what job the liberated workers will be placed. We already have extensive experience, which confirmed that the fuss related to this is capable of paralyzing the energy of even the most active and progressive directors. Of course, such a mechanism would not work if the practice of every possible "assignment" of the work force to vegetable depots, kolkhozes and sovkhozes, for cleaning up the city, etc., remains in effect. In this case, any leader, even one endowed with the most advanced thinking, will be forced to stipulate a certain cadre "appropriation," which enables him to make ends meet at a difficult time. It would be possible to provide for the "peak" work force requirements of the corresponding organizations on the basis of contract relations with citizens (not with enterprises!).

Does Everyone Need to Work?

However, industry does have needs for manpower. So that economic development occurs successfully, these needs should be satisfied. There is also the population's counter-need for jobs. Are we not infringing upon the latter, in so boldly debating the extra workers?

In the bourgeois world, it so happens that scientific and technical progress is paid for by unemployment!

There are circumstances which inspire optimism in the face of this fear. The first is the fact that a reduction in the need for jobs in industry will be accompanied by the development of the service sphere. The fewer the labor outlays for material support, the more forces directed towards building a healthy life for people, full of high spiritual culture, on this basis.

The second circumstance is that today we are significantly increasing the need for workers. The principle of full employment has been turned into the principle of universal employment. We see a situation, in which everyone who is able to work, in terms of age and health, is working as normal. Our life is arranged by the following system: you come of working age, you begin to work and you work, so to speak, from bell to bell. If there is no work for you, nonetheless they will find some, even if there is no need for work.

This situation—we are so accustomed to it that it seems like the only one possible and is extraordinarily difficult to reject—closes the path to cardinal growth in labor productivity. The most important principles of restructuring, already implemented and formulated, remain on paper for now. Really, we need only bring material compensation into conformity with the labor contribution, and overcome equalization. Is this really possible, if there are "extras?" Never! Everyone will work averagely—a carefree life, low intensiveness, the possibility of handling outside matters on work time... And naturally, everyone earns averagely.

On the other hand, people's need for work has significantly increased (this, in general, is the consequence of average work and average pay). Let us consider young people. A significant number of them study at night and correspondence schools which is obviously worse than normal instruction. However, many cannot study in the daytime because of the smallness of stipends. In the 1960s, the stipend in VUZs was about 40 percent of the average wage. It was possible to live modestly, "like a student," on this. In 1986, the stipend was barely 20 percent of the average wage. It is impossible to talk seriously of living on such funds. The change in graduate student stipends is particularly striking: in the 1960s, it was higher than the average wage, now it is only half.

To some extent, the situation is changing as a result of the well-known resolutions to raise stipends for students and graduate students. Obviously, the sizes of these stipends need only be systematically adjusted in accordance with the growth in the average wage.

It is also entirely obvious that most women with small children would prefer not to work, if state aid to the family or the husband's wages would permit this.

Today many retirees are also trying to work. In the 1960s, the maximum pension was 120 rubles, which was higher than the average wage by a factor of 1.5. Now it is slightly over 60 percent of the average.

The recently observed increase in employment and the exaggerated "supply" of labor were manifestations of the reduction in the rates of economic development. The

growth of rates and implementation of the planned social program are normalizing this situation. The need for jobs is decreasing, thus creating a most important prerequisite for the sharp growth of productivity.

Growth of labor productivity makes it possible to optimize the utilization of labor potential. However, there is also a reverse law, which is recognized far less distinctly: without genuinely modern labor organization and without putting cadre policy in order, the growth of productivity is impossible.

The processes of inertia are very strong everywhere, including in the economy. They are difficult to overcome. However, it is necessary. Changing the approach to utilization of labor resources and rethinking ages-old traditions should accompany the appearance of new equipment and all stages of its modernization and reconstruction.

Presidium of USSR Academy of Sciences Announces Organizational Changes

18140340 Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, May 88 pp 135-138

["Scientific and Organizational Decisions of the USSR Academy of Sciences Presidium"]

[Text] The scientific and scientific-methodological leadership of the USSR Academy of Sciences [AS] Siberian Department [SD] Institute of Physics of Strength and Material Sciences has been placed within the Department for Problems in Machine-Building, Mechanics and Control Processes, jointly with the USSR AS Department of General Physics and Astronomy.

The USSR AS Bashkir Branch was converted into the Bashkir Scientific Center of the USSR AS Urals Department.

The USSR AS Komi Branch was converted into the Komi Scientific Center of the USSR AS Urals Department.

The Perm Scientific Center of the USSR AS Urals Department was established on the basis of scientific institutions located in Perm.

The Scientific Research Institute under the Udmurt ASSR Council of Ministers was converted into the Institute of the History, Language and Literature of Udmurtia, USSR AS Urals Department, and included within the USSR AS Department of History. The scientific and methodological leadership of the institute was given to the USSR AS Department of History and the Department of Literature and Language.

The Urals Branch of the USSR AS Institute of Machine Sciences imeni A.A. Blagonravov was converted into the USSR AS Urals Department Institute of Machine Sciences. The scientific and methodological leadership of the institute is still entrusted to the USSR AS Department of Problems in Machine-Building, Mechanics and Control Processes.

The USSR AS Far East Scientific Center Institute of Ocean Economics was converted into the USSR AS Far East Department Institute for Economic and International Problems of Mastering the Ocean.

On his personal request, Academician **M.A. Markov** was released from his duties as chairman of the Soviet Paguoshskiy Committee. M.A. Markov was thanked for his long and fruitful work in this position.

Academician **V.I. Goldanskiy** became chairman of the Soviet Paguoshskiy Committee.

Academician **V.I. Goldanskiy** was released from his duties as chairman of the USSR AS Commission on Synchrotron Radiation, on his personal desire. Gratitude was expressed to V.I. Goldanskiy for his many years of fruitful activity as the chairman of this commission.

Academician **S.T. Belyayev** was approved as chairman of the USSR AS Commission on Synchrotron Radiation.

Academician **N.N. Bogolyubov** was released from the post of temporary acting director of the USSR AS Mathematics Institute imeni V.A. Steklov in connection with expiration of the term of office and on his personal request. N.N. Bogolyubov was thanked for great and fruitful work in the leadership of this institute.

As of 1 February 1988, Academician **V.S. Vladimirov** has been acting director of the USSR AS Mathematics Institute imeni V.A. Steklov.

A.M. Finkelshteyn, candidate of physical and mathematical sciences, was named temporary acting director of the USSR AS Institute of Applied Astronomy.

Academician **D.V. Skobeltsyn** was named honorary director of the USSR AS Physics Institute imeni P.N. Lebedev.

Academician **Zh.I. Alferov**, elected by the General Meeting of the Department of General Physics and Astronomy, was approved as director of the USSR AS Physical and Technical Institute imeni A.F. Ioffe.

Academician **N.S. Solomenko** was released from his duties as first deputy chairman of the USSR AS Leningrad Scientific Center Presidium on his personal desire, and has remained on its staff. Gratitude was expressed to M.S. Solomenko for great contribution to the development of science and scientific-organizational work during his term of office.

V.M. **Ponomarev** (USSR AS Leningrad Institute of Information Sciences and Automation), doctor of technical sciences, was approved as first deputy chairman of the USSR AS Leningrad Scientific Center Presidium.

The following, elected by the USSR AS SD General Assembly, were approved as institute directors in the USSR AS SD:

I.M. Gadzhiyev, doctor of biological sciences—director of the USSR AS SD Institute of Soil Science and Agrochemistry;

N.V. Igoshin, doctor of economic sciences—director of the USSR AS SD Yakutsk Branch Institute of Economics for the Comprehensive Mastery of the Natural Resources of the North;

Academician **V.A. Koptyug**—director of the USSR AS SD Novosibirsk Institute of Organic Chemistry;

V.M. Korsunov, doctor of biological sciences—director of the USSR AS SD Buryat Branch Institute of Biology;

G.F. Krymskiy, corresponding member of the USSR Academy of Sciences—director of the USSR AS SD Yakutsk Branch Institute of Astrophysical Research and Aeronomy;

Academician **M.M. Lavrentyev**—director, USSR AS SD Institute of Mathematics;

V.P. Larionov, doctor of technical sciences—director of the USSR AS SD Yakutsk Branch Institute of Physical and Technical Problems of the North;

Academician **V.Ye. Nakoryakov**—director, USSR AS SD Institute of Thermal Physics;

R.K. Salyayev, USSR AS corresponding member—director, USSR AS SD Siberian Institute of Plant Physiology and Biochemistry, for a new term;

N.G. Solomonov, doctor of biological sciences—director, USSR AS SD Yakutsk Branch Institute of Biology;

V.M. Titov, USSR AS corresponding member—director, USSR AS SD Institute of Hydrodynamics imeni M.A. Lavrentyev.

S.I. Rybakov, doctor of geological and mineral sciences, was released from the position of temporary acting deputy chairman of the USSR AS Karelian Branch Presidium, at his own wish.

The position of acting deputy chairman of the USSR AS Karelian Branch Presidium was given to **V.S. Kulikov**, candidate of geological and mineral sciences.

M.M. Zaripov, doctor of physical and mathematical sciences, was released from his duties as director of the USSR AS Kazan Physical and Technical Institute imeni Ye.K. Zavoyskiy, Kazan Branch, at his own wish. M.M. Zaripov was thanked for his many years of fruitful scientific work during his term as director of this institute.

Academician **B.M. Pontekorvo** was released from his duties as chairman of the USSR AS Scientific Council on Neutrino Physics. B.M. Pontekorvo was thanked for his many years of fruitful work as the chairman of this council.

G.V. Domogatskiy, doctor of physical and mathematical sciences, was approved as chairman of the USSR AS Scientific Council on Neutrino Physics.

A.A. Voronov, academician, **S.A. Yevteyev**, doctor of geographical sciences (USSR AS Scientific Council on Problems of the Biosphere), and **I.A. Lavrov**, candidate of physical and mathematical sciences (USSR AS Scientific Organizational Department) were made buro members of the USSR AS Commission on Biospheric and Ecological Research.

V.Ye. Aperyan, doctor of economic sciences (USSR Academy of Sciences Editorial and Publishing Council), **V.V. Bugrovskiy**, doctor of technical sciences (Institute of Control Problems (Automation and Telemechanics) of USSR Minpribor and the USSR AS), **B.O. Milenin**, candidate of technical sciences (USSR GKNT), **S.A. Pegov**, doctor of technical sciences (USSR AS All-Union Scientific Research Institute for Systems Research), and **L.P. Rysin**, doctor of biological sciences (USSR Academy of Sciences Department of General Biology) were approved as members of the USSR AS Commission on Biospheric and Ecological Research.

Responsibility for the timely coordination of the preparation of the USSR AS Program for Biospheric and Ecological Research in the Period to the Year 2015, was given to **S.A. Yevteyev**, doctor of geographical sciences.

K.D. Lavrenenko was released from his duties as editor-in-chief of the USSR AS journal TEPLO ENERGETIKA in connection with his retirement for reasons of health.

V.I. Dobrokhotov, doctor of technical sciences, was appointed editor-in-chief of the USSR AS journal TEPLO ENERGETIKA.

Academician **G.S. Pospelov** was released from his duties as editor-in-chief of the journal IZVESTIYA AN SSSR. TEKHNICHESKAYA KIBERNETIKA. G.S. Pospelov was thanked for his great and fruitful work as the editor-in-chief of this journal.

Academician **Ye.A. Fedosov** was made editor-in-chief of the journal IZVESTIYA AN SSSR. TEKHNICHESKAYA KIBERNETIKA.

A.K. Pikayev, doctor of chemical sciences, was appointed editor-in-chief of the USSR AS journal KHIMIYA VYSOKIKH ENERGIY.

Academician **L.M. Brekhovskikh** was released his duties as editor-in-chief of the USSR AS journal OKEANOLOGIYA. L.M. Brekhovskikh was thanked for many years of fruitful work as the editor-in-chief of this journal.

R.V. Ozmidov, doctor of physical and mathematical sciences, was made editor-in-chief of the USSR AS journal OKEANOLOGIYA.

Academician **A.V. Zhirmunskiy** was released from his duties as editor-in-chief of the USSR AS journal BIOLOGIYA MORYA. A.V. Zhirmunskiy was thanked for many years of productive work as the editor-in-chief of this journal.

V.I. Kasyanov, doctor of biological sciences, was appointed editor-in-chief of the USSR AS journal BIOLOGIYA MORYA.

A.P. Andriyashev, USSR AS corresponding member, was released from his duties as editor-in-chief of the USSR AS journal VOPROSY IKHTIOLOGII. Gratitude was expressed to A.P. Andriyashev for many years of productive work as the editor-in-chief of this journal.

N.V. Parin, doctor of biological sciences, was appointed editor-in-chief of the USSR AS journal VOPROSY IKHTIOLOGII.

Academician **V.Ye. Sokolov** was released from his duties as editor-in-chief of the USSR AS journal ZOOLOGICHESKIY ZHURNAL. V.Ye. Sokolov was thanked for his many years of productive work as the editor-in-chief of this journal.

Academician **L.P. Tatarinov** was made editor-in-chief of the USSR AS journal ZOOLOGICHESKIY ZHURNAL.

M.V. Gorlenko, USSR AS corresponding member, was released from his duties as editor-in-chief of the USSR AS journal MIKOLOGIYA I FITOPATOLOGIYA. M.V. Gorlenko was thanked for many years of fruitful work as the editor-in-chief of this journal.

I.A. Dudka, doctor of biological sciences, was appointed editor-in-chief of the USSR AS journal MIKOLOGIYA I FITOPATOLOGIYA.

M.S. Mitskevich, doctor of biological sciences, was released from his duties as editor-in-chief of the USSR AS journal ONTOGENEZ. M.S. Mitskevich was thanked for his many years of productive work as the editor-in-chief of this journal.

A.T. Mikhaylov, doctor of biological sciences, was appointed editor-in-chief of the USSR AS journal ONTOGENEZ.

Academician **L.P. Tatarinov** was released from his duties as editor-in-chief of the USSR AS journal PALEONTOLOGICHESKIY ZHURNAL. L.P. Tatarinov was thanked for his many years of fruitful work as editor-in-chief of this journal.

I.S. Barskov, doctor of biological sciences, was appointed editor-in-chief of the USSR AS journal PALEONTOLOGICHESKIY ZHURNAL.

Academician **V.N. Bolshakov** was released from his duties as editor-in-chief of the USSR AS journal EKOLOGIYA. V.N. Bolshakov was thanked for his many years of fruitful work as editor-in-chief of this journal.

L.F. Semerikov, doctor of biological sciences, was appointed editor-in-chief of the USSR Academy of Sciences journal EKOLOGIYA.

Training Personnel for CEMA S&T Program

18140313 Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 4, Apr 88 pp 8-12

[Article by Vadim Kokarev, Moscow State University imeni M.V. Lomonosov, USSR, and Vladilen Andriyeshin, CEMA Secretariat: "Cadre Training Problems"; first paragraph is EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV introduction]

[Text] Taking into account the long-term foundation for the implementation of the Comprehensive Program for Scientific and Technical Progress of CEMA-Member Countries (KP NTP) and the need to periodically renew the list of tasks included in its five priority trends, the provision of cadres for organizations and enterprises—the participants in implementing the KP NTP—is becoming a repeated or short-term measure. It requires constantly intensifying attention.

Even before the preparation of the KP NTP for the solution of problems, developed in accordance with agreements on multilateral scientific and technical cooperation, cooperation on cadre problems has yielded definite positive results. This was confirmed by a study, conducted by a Moscow State University research group, of the results of a survey of 50 KOTs located in Bulgaria, Hungary, the GDR, Poland, Rumania, the USSR and Czechoslovakia. Thus, more than 48,000 different categories of workers participated in 4,713 events in 1981-1985 (symposiums, conferences, seminars, specialized exhibition-schools, and so on).

In addition to such traditional national and international forms for training and increasing the skills of cadres, such as graduate studies, field work, symposiums and seminars, new forms of cooperation have been found. These include exhibition-schools for scientific and technical cooperation programs, joint training-preparation of assignments on problems, work meetings on specific subjects, scientific reports at meetings of authorized councils, and so on. Considerable experience has been accumulated in multilateral cooperation on various aspects of science and technology, including in the provision of information, the purchase and use of licenses, training and increasing the skills of cadres, and forecasting.

At the same time, many head organizations, which coordinate work on KP NTP problems, have only just started implementing their functions. They are unfamiliar with the subtleties and specific features of this work, which is entirely explainable. This is because it is necessary to characterize the basic problems and main trends of the multilateral cooperation in the training, retraining and raising the skills of scientific, engineering, technical and work cadres in order to meet the needs for them of the organizations and enterprises of countries participating in solving KP NTP problems.

Today, there are two alternative approaches to these problems: as a rule, countries approach cadre training either proceeding from separate problems, or on the whole according to the priority trend. Different approaches by CEMA-member countries to the organization of training and raising the skills of cadres have been observed.

For example, in the first priority trend—the electronization of the national economy—the problem of "Improving the Educational System on the Basis of Use of Computer Hardware" is singled out. In it, interested CEMA countries have coordinated technical and economic grounds for work and a detailed program of cooperation, but are in no way dealing with questions of determining the need for cadres and satisfying it. From the name of the problem itself and the detailed program, it is impossible to understand how it proposes to provide cadres for the organizations and enterprises which are participating in implementing the KP NTP.

Within the framework of the second priority trend—comprehensive automation—on the problem of "Development and Organization of Specialized and Cooperative Production of Flexible Manufacturing Systems for Machine Building and their Extensive Application in the National Economy," the preparation of a program for the educational and methodological support and exchange of experience in training cadres to design and use flexible manufacturing systems (FMS) is stipulated. The program includes positions on determining the lists of professions for training cadres at all three levels, which conform to the needs of the countries, base VUZs and other establishments which train such cadres, according to the development of standardized methodological materials and exchange of experience in their training and retraining. Thus, virtually an entire set of measures for providing cadres in the course of cooperation in solving very important scientific and technical tasks—the creation of FMS—is stipulated. However, the second priority trend includes 13 tasks and, whereas some of them are developed in agreements, signed before the adoption of the KP NTP and which had determined the forms and methods for organizing cooperation in training and raising the skills of cadres, this area is untouched in the agreements which cover a significant share of the new problems.

The situation is different in the fifth priority trend—the accelerated development of biotechnology—which includes the program for "Training and Raising the Skills of Scientific and Engineering Cadres in the Field of Biotechnology." The detailed program of cooperation outlines a large set of projects for the co-implementing organizations to provide cadres with higher scientific skills, specialists with higher and secondary specialized education, as well as a planned increase in the skills of managers, scientific workers and specialists in a broad spectrum of scientific trends and professions, for all of the tasks in this priority trend. It is proposed that base

educational institutions in the CEMA countries be determined which, according to coordinated professions, would conduct the training and raising of skills of scientific and technical cadres for other fraternal countries.

The interested countries plan to start up more intensive forms in this area, organizing specialized centers at the scientific education base of large VUZs. For example, it has been proposed to create a center for the training and raising the skills of scientific cadres in genetic and cellular engineering, industrial microbiology, applied virology, protein engineering and engineering enzymology, technological bioenergetics, etc., at Moscow State University imeni M.V. Lomonosov, and centers for training agricultural specialists and biotechnologists, at the Timiryazev Agricultural Academy (USSR) and in Czechoslovakia. Other proposals are also being drafted.

Thus, at the initial stage of the implementation of KP NTP, cooperation on cadre problems still does not have a strictly defined methodological base, and the fundamental approaches of the system for managing this activity have not been worked out.

Taking the existing situation into consideration, in October 1986 the permanent work group for cooperation in training and raising the skills of scientific cadres (the PRG on scientific cadres), of the CEMA Committee for Scientific and Technical Cooperation (KNTS), developed and coordinated the Standard Program for Scientific and Technical Cooperation of CEMA-Member Countries in the Organization of Training, Retraining and Raising the Skills of Scientific Cadres, Specialists With Higher and Secondary Specialized Education and Work Cadres, Needed to Ensure Work on Problems of the Priority Trends of KP NTP. This program, which includes all of the necessary stages of cooperation among interested fraternal countries on cadre problems in the framework of the corresponding problem, could become a requisite support for the head organizations which coordinate work in a given area. As a methodological document, unquestionably, it makes it possible to introduce a definite uniformity in approaches to the organization of such cooperation, with sufficiently high demands on its level and effectiveness.

The work group has also prepared the Program of Scientific and Technical Cooperation of CEMA-Member Countries in the Area of Reciprocal Training, Raising the Skills (Retraining) of Scientific Cadres, Specialists With Higher and Secondary Specialized Education and Skilled Workers in the Priority Trends of KP NTP, which was examined and approved at the 37th (special) meeting of the KNTS (August 1987).

This program differs insignificantly from the standard and includes stages such as:

Determining the basic professions for training cadres of all three skill levels, proceeding from their scientific and industrial orientation, as well as for all problems developed in the priority trend;

Revealing the needs of the organizations and enterprises, participating in the implementation of problems, for such cadres;

Coordinating the volumes of reciprocal training of scientific, engineering and technical and work cadres to the year 2000, with a distribution according to the countries, number of years and methods of their training.

Improving educational programs, with a consideration of scientific and technical programs;

Organizing a system for raising cadre skills.

This program for cooperation in providing cadres for the priority trend of the KP NTP on the whole, however, functions as a summary document, containing the necessary data on both the entire trend, as well as on each individual problem. In fact, in a number of problems included in the priority trend, the need for cadres in the same profession can be revealed. In order to eliminate redundancy in handling questions on the volumes of reciprocal training of such cadres, on improving educational programs for training specialists of different skill levels in cooperating CEMA-member countries, and on determining base educational institutions which train cadres for other fraternal countries, it would be expedient to achieve definitive arrangements for cooperation in the training of cadres for a priority trend.

Incidentally, it is easier to coordinate the need to train cadres in the same profession, according to problems of not only one priority trend, but of others as well, at the level of the five KP NTP trends, than it is to seek out analogs in over 90 problems. Therefore, it is deemed expedient to solve the questions of providing cadres among interested CEMA-member countries primarily within the framework of cooperation on the problem level and to coordinate on the whole along the priority trend. Experience acquired within the CEMA framework attests to this.

It is well known that, in the course of four 5-year periods, the PRG for Scientific Cadres, on the basis of the needs of interested countries, is already developing draft plans for the reciprocal exchange of graduate students and field workers, distributed according to the number of years, volumes and places of training. Coordinated at KNTS meetings, these plans are being implemented among countries on a bilateral basis according to intergovernmental agreements. Over 1972-1975, 1976-1980 and 1981-1985, they were essentially fulfilled.

In our opinion, this gives an opportunity to propose a certain mechanism for developing cooperation in providing cadres for KP NTP. Above all, it is necessary to commence the functioning of the head organizations which coordinate work on the problems and the authorized councils (perhaps, these will be councils of directors), which ought to become the basic element that determines cadre policy. Its first priority tasks would include:

Forecasting the further (long-term, in 15-20 years) development of scientific trends within the framework of the programs for cooperation on problems which are being developed;

Selecting professions in the training of scientific, engineering and technical and work cadres and studying the requirements for their level, proceeding from scientific and practical tasks in the new and developing trends of science and technology;

Establishing the need of the organizations participating in the implementation of KP NTP for cadres at all three skill levels for the future and sending the corresponding persons for training, distributed among CEMA-member countries according to professions and according to the number of years of training, with an indication of the possible sites for training (the name of educational institutions);

Determining the number of sites for field work and for raising the skills of scientific workers and specialists, distributed according to CEMA-member countries and years of instruction, as well as coordinating the forms and types of a network of courses for raising skills and of places for field work and raising skills;

Organizing the practical implementation of coordinated plans for cadre training, retraining and raising of skills by way of cooperation by CEMA-member countries within the framework of the problems which are being worked on.

Considering the large volume of summary works and the need for specific assistance to the head organizations, which coordinate the work on problems, and to the co-implementing organizations for over 90 large sectorial and intersectorial problems, the KNTS work group (the PRG for Scientific Cadres) should take responsibility for organizing cooperation on providing KP NTP cadres and for methodological management. In this regard, its previously approved tasks and functions should be refined and supplemented, since in its new activity the work group will be required to deal with the questions of training and raising the skills not only of scientific cadres but also of specialists with higher and secondary specialized education, as well as of workers.

Accordingly, the PRG for Scientific Cadres should represent ministries of higher education, ministries of education, state committees on professional and technical education and ministries and departments on labor and social issues, as well as, most likely, the planning agencies of CEMA-member countries.

In solving basic problems related to providing cadres for KP NTP, the PRG for Scientific Cadres would be responsible for:

Studying educational programs and plans for training cadres according to type of discipline in the CEMA-member countries in order to provide the appropriate cadres for priority trends of KP NTP;

Assisting in the improvement of national educational programs and plans for training cadres on the basis of studies of their level and with a consideration of international requirements, made of the training level of cadres, for the purposes of their convergence within the framework of countries in the socialist community;

Coordinating, among CEMA-member countries, the volumes of cadre training and raising of skills within the next 5-year period according to scientific sectors and professions, with a consideration of existing educational sites within the corresponding countries, and annually refining these plans;

Submitting data for examination by the KNTS on the coordinated volumes of reciprocal cadre training and raising of skills within CEMA-member countries for the next 5-year period, and annual information on the course of fulfillment of these plans;

Assisting in implementing the volumes, coordinated by the KNTS on a multilateral basis, of reciprocal cadre training, retraining and raising of skills, necessary for solving problems of the priority trends of KP NTP, according to bilateral inter-governmental agreements;

Assisting in the organization by CEMA-member countries of symposiums, conferences, seminars and other measures to exchange experience in cadre training, retraining and raising of skills;

Offering methodological assistance to the head organizations, which coordinate work on problems, and to the organizations responsible for implementing work within CEMA-member countries in the course of cooperation on cadre questions, and creating and improving the organizational and methodological foundations for said work;

Developing, jointly with the head organizations which coordinate work on the problems, proposals for creating international centers for cadre training, retraining and raising of skills, as well as determining the base organizations for regularly holding seminars, summer and winter schools for young scientists and other events, according to the appropriate scientific trends.

In order to raise the competence and effectiveness of the solution of said tasks, it is necessary to single out three structural formations within the PRG for Scientific Cadres which correspond to the three levels, having named them either by meetings (councils) or by groups.

Each of them should ensure the preparation and consideration of a set of tasks at each cadre skill level with a consideration of the specific nature of the training, retraining and raising of skills. It is necessary to assume that all questions concerning scientific cadres should be run by the Conference of Representatives of Departments of CEMA-Member Countries on Science and Technology, Higher Education and Academies of Sciences; concerning cadres with higher and secondary specialized education—by the Conference of Representatives of Departments on Higher Education and Education; concerning work cadres—accordingly by the departments for labor and social problems, education and professional and technical education.

Not only the high exigency towards the level of their professional knowledge, but also the in-depth study by scientific cadres and specialists of problems in foreign economic relations, international hard-currency financial relations, the psychology of foreign economic activity, etc., are important. For this purpose, it is necessary to supplement educational programs for training and raising the skills of specialists with the appropriate divisions.

It is well-known that special courses are held for the more rapid adaptation of specialists in a number of CEMA-member countries for candidates, recommended for work in the CEMA Secretariat and other international economic organizations. However, these are not held everywhere and, moreover, differ in terms of the programs and time periods for training the specialists. Meanwhile, the number of people involved in multilateral cooperation on the problems of KP NTP and in solving other scientific and technical and economic problems is increasing. In order to develop close reciprocal approaches to work in international collectives, the time has come to solve the question of creating international CEMA centers for raising the skills of cadres in the area of socialist economic integration.

Employees of the work apparatus of the head organizations on problems and KOTS, specialists from the CEMA Secretariat, employees in the foreign relations administrations of ministries and departments of CEMA-member countries, and the secretaries of delegations of countries within CEMA groups and of their work groups, would not only be able to carry out training in this center, but also to perform scientific research and methodological work on cadre problems. Its creation on the basis of the CEMA Secretariat would be the most expedient.

Postgraduate Training for Engineers

18140048a Riga SOVETSKAYA LATVIYA in Russian 10 Aug 88 p 2

[Article by O. Brinkmanis, prorector of postgraduate training at the Riga Polytechnic Institute, under the rubric "From the Rostrum of the Party Conference—into Practice": "Postgraduate Training of Engineers—They Are Engaged in It at the Riga Polytechnic Institute"]

[Text] General educational or vocational and technical school, school or tekhnikum, and VUZ—such are the successive steps of public education. But a VUZ diploma does not mean that no reason exists for anyone to study further. A tremendous number of unpromising and useless specialists came into being solely because the diploma opened the way to a position or chair where specialized knowledge was not particularly required of a person. The constantly expanding and controlling apparatus absorbed such "engineers" in large numbers.

Active introduction of the achievements of scientific and technical progress and realization of the new mechanism of management and change in the character of production as a whole require a qualitatively new level of personnel training and retraining. However, thus far there has been observed everywhere a desire on the part of specialists of the national economy to avoid study in the system of qualifications upgrading. This can be explained by this system's low-level of effectiveness. In order to improve it, we need first of all realistic educational plans and programs corresponding to production needs. After seriously weighing "pros" and "cons," they at the Riga Polytechnic Institute initiated in the fall of last year postgraduate training of engineers. The "pros" included a rather high level of methodological and scientific-technical training of specialists, a good material and tachnical base at the institute, real resources for providing students with all the necessary literature and also the existence of VUZ—production feedback.

The last-named is especially important. Educational-scientific-production complexes have been organized at the republic's leading enterprises, the Riga Electrical Equipment Plant imeni V.I. Lenin, Radiotekhnika, the Riga Railroad Car Building Plant, the Ogre Knitwear Combine and others. The Riga Polytechnic Institute jointly with the Latvian SSR Academy of Sciences has created two scientific-educational centers. Twenty-two of the institute's departments have their own affiliates in production in practically all specialties. It is also important that our instructors acquire work experience at the the Riga Machine-Building Intersectoral Scientific-Technical Complex, the scientific and technical center of reliability of automatic equipment, the republic center of laser technology and the MEKONT Intersectoral Advisory Center. This promotes the strengthening of ties between production and the educational process and bolsters theoretical training of practical skills. Consequently, postgraduate training of specialists, managers and graduates of our VUZ could be quite effective.

Today our postgraduate training is organized at three newly created departments. The educational process is proceeding seriously at the special department of the machine-building complex. The period of study here is 9 months at the day division and 18 months at the evening division. On completing the department, engineers acquire a new specialty, which is confirmed by a certificate.

In the present educational year, training was carried out at the department in two specialties—designing of automated and designing of microprocessor systems. In the

new educational year, we shall also organize admission of students in the specialty of robotics and flexible automated production. In the course of the studies, students will become acquainted with designing robots and a complex of robotic equipment and the basic principles of flexible automated production devices. They will also master fundamentals of modeling, algorithms of programming and information support of programs. Special attention is given to the technological bases of machnization and automation of production processes and the use of micro- and minicomputers. Students will be involved in the solution of concrete production problems brought up by corresponding sectors of production. For course and certificate projects specific themes will be employed pertaining to questions on organization of labor, technology and the economcs of corresponding enterprises.

At a special department, training is being organized of engineers and economists in the field of foreign economic relations. Three-month training is provided at this division and 6-month training at the evening division in direct foreign economic relations with foreign firms and questions concerning the situation in foreign relations and prices. In addition, students will have the possibility of supplementing their knowledge of foreign languages (principally English), the psychology of business relationships and other specific subjects. We have established business contacts with the All-Union Academy of Foreign Trade. Instructors invited from there will present a course of lectures and conduct a number of seminar studies. Inasmuch as direct economic ties of the republic's enterprises are being intensively developed and we have practically no specialists in this field, the work is very necessary.

At the department of qualifications improvement, training has been organized of top managers of the construction complex. The department's task is to train students in effective methods of planning and economic stimulation, techniques of improving methods of management, organization and management of production, technology of construction, economy of power and resources in construction and protection of the environment. For specialists of planning construction organizations, upgrading of qualifications is carried out for various subjects. For architects, for example, the topic of study is consideration of regional features in construction in the Latvian SSR; for specialists in industry and civil construction, it is systems of construction and automated design; for specialists in heat supply and ventilation, it deals with pressing questions of economy of energy.

Departments of the Riga Polytechnic Institute offer 90 training series involving the most diverse problems of development of industry, construction, transport, economics and protection of the environment. The last-named problem is of increasingly growing concern to the public. The chief consideration on which it is necessary today to direct attention is protection of water resources (purification works), the technology of protecting the atmosphere, land resources and waste-free technology. It is planned in connection with these topics to conduct studies at the department of cyclical training. Specialists and head personnel of the appropriate sectors are being brought in as lecturers.

Right now about 1,200 managers and their deputies are working at republic enterprises and organizations. At the same time, the problem of a reserve for their replacement remains acute. Its solution could be helped by an effective system of postgraduate training of actual economic managers and their replacement, especially in the context of economic training on the level of a second higher education. It has clearly become necessary to create a specialized department for training a reserve of managerial personnel for industry and construction from among existing potentialities for this activity of engineers. In the course of 6-9 months in the day division, they could complete a course for "managers" and receive a certificate affirming the aquisition of a new specialty. Those engineers who would like to obtain a second specialty (instead of studying at evening or correspondence divisions of the general technical department with registration for a second course) could avail themselves of such a form of training.

The Riga Polytechnic Institute has adequately qualified personnel and all the resources for organizing full-value training and preparation of a reserve of managers. We possess the necessary base to provide for upgrading of qualifications and requalification of personnel and to organize properly the teaching process. But necessary does not mean adequate. Things are at a standstill. The rapid development of the scientific and technical revolution requires timely restructuring and reequipment of the teaching process. Even now it manifestly lacks computer equipment. There are difficulties caused by a shortage of lecture rooms and placement of students from other cities. Here we need help from Gosplan and the republic's Council of Ministers. After all, in the final analysis our students are their chief reserve and support in carrying out restructuring of the economy.

Self-Financing Causes Monetary, Education Conflicts in VUZ's

18140043 Moscow SOVETSKAYA ROSSIYA in Russian 5 Oct 88 p 3

[Article by M. Komarovskiy under the rubric "Experience": "A Contract for Discoveries"]

[Text] When USSR State Prize winner Professor Boris Ivanovich Kryukov said that many higher educational institutions of the country could in a year or two change over to full cost accounting and even earn independently considerable money in currency, this looked like a penchant for wild schemes. However, later it became clear that new opportunities had come to light for Professor Kryukov in connection with the establishment of the Wave Processes and Technologies InterVUZ Cost Accounting Engineering Center, the first in the country. But everything in its order.

In Moscow, Voronezh, Novosibirsk and Leningrad, Kuybyshev, Rostov, and other cities scientists are actively seeking means of using vibration, ultrasonic, pulsed, magnetic, and other actions, which are invisible to the eye and are capable of bringing about a revolution in many sectors.

But the new equipment will not get to enterprises soon. Why? The point is that for production any development should be properly prepared. It is necessary to perform planning and design work, to produce a prototype, to conduct tests of it, and to prepare the technical specifications. In the relations between scientists and production workers precisely this stage most often becomes the stumbling block which hinders the introduction of scientific and technical innovations.

Is it possible for the accomplishment of this task in the area of wave technologies to use the potential of higher educational institutions? Certainly. Especially if you consider that they have specialists of all fields of knowledge—from mathematics, physics, and designing to economics and biology. They came to precisely such a conclusion in the RSFSR Ministry of Higher and Secondary Specialized Education.

I foresee the grin of skeptics: now higher educational institutions have also plunged into cost accounting activity, will begin to pursue rubles and kopecks, and will forget that their main and basic task is to educate students, and not to earn money. But here is what the paradox is: from the activity of the interVUZ center the training of students not only is not suffering, but, on the contrary, is gaining in all respects.

"It has already become a tradition to attract students to scientific research," Professor A. Tikhonov, rector of the Moscow Institute of Electronic Machine Building, relates. "At our institute, for example, not one scientific job gets by without their participation. This has yielded an impact—the progress in studies has increased, they have begun to take our graduates more willingly at scientific research institutes and design bureaus. And all the same we were simply unable to cross a certain boundary—as before, the complaints of industry that young people take a long time to adapt to work in their specialty were encountered.

"We began to analyze the causes of this. And it turned out: the main trouble is the 'broad' type of training of specialists. With what they will have to deal in life, at what works and with what technology they will have to work—all this is decided in the last year, prior to the presentation of the diploma. Therefore, one has to teach students everything and in general nothing specifically.

"We came to the conclusion that it is necessary to orient the future specialist from the first days of instruction toward work with a specific technology. Moreover, it should be a promising one without fail, even fundamentally new one, which is just emerging in VUZ laboratories."

Not by chance did we turn to the rector of the Moscow Institute of Electronic Machine Building. The Wave Processes and Technologies InterVUZ Engineering Center was established under the "roof" of precisely this institute.

But one cannot, of course, solve all problems within one higher educational institution. Therefore, it was also decided to make the center an interVUZ center. In addition to scientific research subdivisions, planning and design bureaus and a pilot works will be included in it.

What problems will the interVUZ engineering center set to work on first of all? Professor B. Kryukov, its scientific supervisor, relates:

"Several directions are specified in our program. Among them are the development of materials with preset properties (including composite materials), the development of technologies, which are waste-free and harmless to the environment, and the designing of new highly productive mechanisms that are based on the principles of vibration. The results of this research will find extensive use in various sectors. For example, a treatment plant, which makes it possible to increase water quality significantly and to decrease the content of ozone, fluorine, chlorine, and other reagents, which are rather harmful to human health, will soon appear at one of the Moscow water stations.

"Household appliances are also not remaining aloof. In particular, one of the developments of the center is a fundamentally new washing machine, which as compared with the traditional washing machine not only washes better, but also consumes nearly half as much detergent and water."

And here is the opinion of RSFSR Minister of Higher and Secondary Specialized Education Academician I. Obraztsov:

"As a mechanics scholar I can confidently say that wave processes are one of the few fields of science, in which today serious discoveries, which have a direct outlet to practice, are most likely.

"The new form of the organization of scientific research at the higher school seems very promising to me. The interVUZ engineering center, by not having any departmental boundaries, can enlist in the work highly skilled specialists of any type—many of them work at higher educational institutions of the country. The principles of cost accounting and direct contracts with enterprises will ensure the great efficiency of developments. Finally, there has appeared for higher educational institutions the opportunity to change radically the process of training students, by 'drawing' them from the first year into the development of equipment for future work."

GKVTI Official Comments on Achieving Western Levels of Computer Technology

18140038a Moscow IZVESTIYA in Russian
30 Sep 88 p 3

[Interview with Vyacheslav Vladimirovich Korchagin, deputy chairman of the USSR State Committee for Computer Technology and Information Science, by I. Novodvorskiy: "What Does a Computer Have in Its Head?—Woes of Programmers—A Loss for All"; first two paragraphs are source introduction]

[Text] Will we be able to make our computer equipment highly intelligent and to utilize our own and the world's information potential, and will we be able in this regard to reach the level of industrially developed countries?

I am having a conversation on this theme with V. Korchagin, the deputy chairman of the USSR State Committee for Computer Technology and Information Science.

IZVESTIYA: Vyacheslav Vladimirovich, the facts and figures that have recently become available to the public oblige us to seriously ponder: will we be able by the end of the century to catch up with the developed countries in this sector?

V. V. Korchagin: We are actually at present at a critical stage. Computers do not come into being of their own accord out of nothing. Their production includes in itself elements and components based on the most modern technologies: superpure chips, metals and plastics with very high and stable properties, the application of superthin coatings and much else—that what is called science-intensive production of the highest standard and purity.

Let me remind you that we are talking of mass production. It would be possible to eliminate the lag only in the event where a radical restructuring of the entire economy is carried out—industry's potential would be fuliy revealed and there would be healthy competition and pay for the end result of production. Wide-scale cooperation with socialist countries and Western firms and the acquisition of licences and production equipment are needed. Incidentally, this is how they started in India, China, South Korea, and now they have rather good computers.

It is necessary to look for an item in our sector for export. This is necessary if only to partially cover foreign-exchange expenditures needed among other things for the creation of joint enterprises. Such an item could be software—we have in the country many qualified programmers and mathematicians.

IZVESTIYA: To trade in software on the international market! And this when we trade in the domestic market in such a commodity very weakly? Last year we sold in the country software and provided industrial services relating to software for less than 100 million rubles while in the United States that same year this indicator amounted to 4 billion rubles.

V. V. Korchagin: I think we should not frighten readers with billions, although this indicator in the United States for all types of computers according to the latest data amounts to about 20 billions. It would be wrong to mobilize our 300,000 army of programmers for an assault on the next gross indicator. A program solves nothing by itself if the user has no computer. Compare: in the United States there are 25 million computers. Of these, 20 million are personal computers, and only at the end of the 5-year plan will we produce our first million personal computers. Another fact—the cost of developing programs in the United States is 10-20 times greater. The main task is not to chase after the total volume of production expressed in total cost but to create as many programs as possible and to more effectively utilize the existing potential of the software industry. Incidentally, the actual aggregate cost of our software is much larger than the 100 million you mentioned—much of it is delivered on the principle "do it for me and I shall do something for you," or simply for free. I bring up all these arguments not as justification but to clarify the situation, of course, without allowing for complacency. The sooner we understand that under the conditions of cost accounting software is a good source of profit, the better.

IZVESTIYA: But does not the "root of evil" lie in this—such a product is treated as if it were paper, nonmaterial, nonserious. Toward the end of the'60s, a staff worker of the Department for Combating Embezzlement of Socialist Property and Speculation asked a programmer the question:

"What were you doing for the past 6 months?" The latter replied that he had created and debugged a program and on the request to show it he brought a stack of punchcards. The reaction of the inspector was remarkable: "It took you half a year to punch these holes?" The times have changed, but even today the opinion is prevalent that a program is a "nothing," an ephemeral quantity, something which cannot be touched with your hands in distinction, for example, to the magnetic tape on which it is recorded. The latter at least has a GOST and a price.

V. V. Korchagin: You are right. It is not understood that software represents national wealth, material assets. There are many reasons for this. Until recently, no reliable economic mechanism existed stimulating the production of a program product. Program producers were isolated. Not everything had been determined in the field of standardization and assurance of software quality. Scientific and market information was not sufficiently organized. Coordination of work in the program industry, which was under various ministries and departments, was poor.

For the purpose of overcoming these defects, it was decided on the basis of our idea to sharply improve work organization in the field of program provision of computer technology and information science.

IZVESTIYA: How many good decisions were there after all?

V. V. Korchagin: The fact is that you can't get things moving ahead with a single decree. It is only a trampoline from which one can make a start. But, it is really a key decision. It provides for the creation of a state system of software for computer technology and information science. For the first time, a number of programs, for the most part of intersectoral use, have become an integral part of the state order.

IZVESTIYA: But won't we crush the incipient program industry with the state order?

V. V. Korchagin: We won't crush but more likely interest the person who receives the state order, and priority provision of computer equipment will be provided. Furthermore, state-order volume would hardly take up more than one-third of the developer's capacities.

Today programs are considered legally to be a product for production and technical use. This determines the questions of their purchase and sale and the pay of a programmer's work. His work is creative. For this reason many people raise the question of an honorarium, a contract system of payment. It can be successfully realized within the framework of the developing cost accounting. All the necessary papers for this are already in the possession of ministries and departments.

The question is also important of present software trade with subsequent service and guarantees. Here a certain amount of experience has already been acquired. The Moscow Experimental Computer Center, for example, accepts orders from organizations for the creation of needed programs, usually in standard packages [tipovyye bloki], semifinished products. Customers have not been complaining, and the profit the center makes is substantial. The Kalinin Tsentroprogramsistem of the USSR Ministry of Instrument Making, Automation Equipment and Control Systems is also quite a profit-making enterprise. The earnings of programmers there are quite high.

The number of copies distributed of the system is very important. Take the Disod System for processing a broad class of data in dialog form. Its total number in the country has reached 1,200 sets. Unfortunately, there are so far few such examples.

Many sectors have set up their own collections of algorithms and programs. But they turn over to them few developments, and they take what is ready very feebly. The average number for the country is equal to 1.3 sets, but at least 200 are needed.

For the work to go forward, it is necessary to establish not on paper but in fact the legal status of a program product, to introduce rules of its purchase and sale for state organizations, cooperatives and individual developers, to establish market information and to provide technical and organizational capabilities of comprehensive software delivery.

Our state committee is now establishing information-science centers (the first have already been opened). They in essence are middlemen between producers and program users. The centers purchase from individual developers programs executed by them on their own initiative and sell them.

IZVESTIYA: It states in the decree that the situation concerning the state software system has been assigned for development by your committee jointly with the Academy of Sciences. Would it not be worthwhile to talk it over with the "computer" community? Incidentally, it increasingly more frequently speaks of the creation of its own creative union, which could cooperate with us and, no offense meant, exercise public control.

V. V. Korchagin: A statute has already been worked out and coordinated and is to go into effect as of 1 October of this year. As for the "computer" community, the USSR Union of Engineering and Scientific Societies jointly with our committee decided to create a scientific-engineering society called "Information Science and Computer Technology." A constituent congress will be held 10 January 1989.

IZVESTIYA: Will we be able in the immediate future to earn foreign currency for the needs of our computerization by trading in programs?

V. V. Korchagin: Today the real fact of the matter is as follows. Joint enterprises with foreign partners whose products will be software have been created or are being created in the country. The Elektronoorgtekhnika Foreign Economic Association has been transferred to be within the framework of the committee. Exporting of programs will be under its jurisdiction, and the first deals have already been concluded. We need only to remember that often Western partners try to buy our products cheaply, which is little helped by our economic illiteracy and the wish to obtain Western equipment sooner in exchange. Consequently, it is necessary to study the market and world market conditions and to learn how to trade and to how to bargain. We in general have much to learn. There is no other way but to learn without breaking away from work. We simply do not have the right to leave our equipment "without a head."

Computer Advisory Group Recommends R&D Strategies

18140038b Moscow NTR: PROBLEMY I RESHENIYA in Russian No 16, 16 Aug-5 Sep 88 pp 6, 7

[Article by S. Pachikov, candidate of physical and mathematical sciences; Working Advisory Group under the president of the USSR Academy of Sciences: "What Should be Done?—An Unexpected Look at the Development of Computerization in the USSR"; first paragraph is source introduction]

[Text] This year, the problems of computerization in our country were discussed on bulletin pages in articles by G. Gromov, F. Shirokov, A. Rakitov, I. Bukreyev and others (NTR, Nos 1, 8, 12, 15).

The computerization situation in which we find ourselves can be variously characterized. It is said that a Japanese businessman did this in an extreme form. In reply to the question of how many years the Soviet Union lags behind the West in the production of computers, he said: "Forever."

It is not difficult to understand such a metaphor. The fact is that the design time of modern electronic products very much depends on that same computer hardware and software which are used for them. The period of time from an idea to a photo model [fotoshablon] and from the photo model to an experimental model can take years with poor equipment or months with good equipment and weeks or days with outstanding equipment. In general, it is impossible to design many modern items in the absence of a necessary computerized system. Thousands of engineers standing besides Kuhlman drafting units (the Kuhlman is a plotting device operated manually) will not replace a person seated at a control console with a 32-bit personal computer provided with programs for designing and imitating new electronic items. Western firms try to use the latest and most productive systems for these purposes. Time is the key factor. If you should get an idea and are not in a position to realize it in a month but only in 6 months to a year, it would be better to sell it to someone who would be able to do it quicker. In a year, your product will be of no use to anyone. (I was once strongly impressed by the following story. The owner of a small firm, on arriving ahead of time at an exhibit of computer hardware, heard in a conversation that it would be good to have a Winchester, a large-capacity magnetic memory storage device in the form of a small magnetic disk that can be inserted into the slot of an IBM XT. He flew to his firm and in several days designed and fabricated a model of such a disk drive, which he brought to the opening of the exhibit.)

The speed of setting up production of new PC models depends very much on the level of computerization of appropriate plants. When new and more powerful models will be put out, new more effective programs for designing microcircuits, computers and equipment will be developed and with their aid new, more powerful ones will be developed... and so on. Comparable feedback also exists in other sectors, only in the field of computer building it occurs extremely fast, in years if not in months that can be counted.

In the time it took for us to develop and introduce 8-bit personal computers, they became completely obsolete. And yet we are planning to teach with them not today's but future schoolchildren. Those who will become engineers in the 21st century. By the time we developed our YeS1840, which resembled 16-bit IBM-compatible personal computers and started their series manufacture... (I won't write in what quantity, otherwise I would be accused of disclosing a fearful secret), IBM ceased their production and want on to a new family of personal computers. (And in the course of the first 7 months put out more than a million of them). And when we, even with the help of joint enterprises, saturate the market with 16-bit PCs, we shall be most likely the only country in the world where they are used.

There are also other factors aggravating the situation: an embargo on the delivery to the USSR of modern computer hardware and technology, an inflexible economy and the monopolism of corresponding electronic-radio-computer-computing departments. All their proposals can be reduced to the words: "concentrate" (naturally, at their places), "centralize" (with them at the head), "develop a unified standard" (that is, establish as a standard what they have developed) and "create a unified state network" (give them 15 years to develop it). The principal conclusions are: "do not permit dissipation of manpower and resources." But inasmuch as in this extremely dynamic field it is impossible to make a 100-percent correct choice, they will drag things out on any pretext, create commissions, postpone a decision till the situation becomes clear by itself or, and this they like the best of all, make the decision "behind the scenes" and possibly they will be on an equal with the "best possible Western models." Then for decades [they will] copy the DEC line of processors, computers and programs, IBM, Intel, and surround everything with a high fence of secrecy, pleading state and military interests. No competition whatsoever, there is a rich client, and the main thing is that he has no place to go. One does not put an ad in the paper: "The Ministry of Defense is conducting a competition for the development of an electronic guidance system. Cooperatives are invited to take part."

(By the way, on the embargo. I shall use the occasion to state a seditious thought: despite many negative consequences, it has also played a positive role—it forced us to direct attention to our own specialists, programmers and scientists. If one does not think of the immediate benefit but evaluates long-term consequences, then the harm inflicted on our computerization in the pre-embargo period, under Nixon, was tremendous. The best manpower, tremendous funds and scads of time were spent on establishing the production of analogues of the most popular IBM/360 system in the'60s, and a whole generation of programmers, "the lost generation" in the words

of Academician A.P. Yershov, was engaged in "uncovering" and adapting to our conditions already prepared Western programs. Now they want to repeat this joke with the popular personal computer of the'80s—the IBM XT. And the same argument is cited: the tremendous software accumulated throughout the whole world for these machines we will inherit almost free).

Then what should we do? Are there any other proposals? It seems to me that one such proposal is contained in the answer to the Japanese anecdote I presented in the beginning. We do not need to catch up with them in the production of computers (after all, Japan is not trying to catch up with us in petroleum production), especially in the way that we are doing it, repeating their route "step by step." It is necessary to try to guess where they are going and to arrive there sooner and wait there a little for them. It cannot be excluded that we might not guess right. That's the risk. In order to reduce it, we can wait for them in several places. One such place I want to describe.

We are saying that in order to concentrate efforts on the development of a programming ideology and programs themselves for fundamentally new computers which are only now getting started and which—today this does not even create an, bt—will significantly determine the character of the world market for information technologies in the immediate future. The Western countries face the difficult problem of a practically total renovation of software costing many tens of billions of dollars and the creation of qualitatively new programs corresponding to the level of new-generation machines. We could find ourselves in a very handy position.

In order to explain what I have in mind and why we "have a chance," I shall briefly describe today's situation in the world of personal computers. A more complete survey is presented in the first issue of the journal V MIRE PERSONALNYKH COMPYUTEROV [In the World of Personal Computers]).

During 1986-1987, the world PC market completed a routine stage of its development. At that time a new stage began whose principal features are the following:

— the reorientation of practically all producers to 32-bit PCs;
— the appearance and rapid spread of PCs using transputers [transpyutery] and RISC [RISK]-processors (this is not an appeal for "risk", the name is derived from the English acronym RISC, which stands for "reduced instruction selection computer");
— the appearance of multiprocessor PCs and, as a consequence, a need for the theory of parallel programming and methods of computed calculations;
— drawing closer of personal computers aimed at the mass market for professional graphics and work stations (that is, on the basis of their capabilities they are coming closer to computer systems that only recently cost 50,000 or more dollars);
— reduction of prices for graphics and work stations and the appearance of a new understanding of the "personal work station";
— a rapid development of telecommunications, as a result of which the PC is becoming a personal terminal station making it possible for the owner to obtain access to a global world network of computers and information centers;
— an accelerating (almost threefold) rate of expansion of the program market compared to the hardware market. (At present the cost of personal hardware for any user already exceeds the cost of the actual PC).

Let us dwell in a little more detail on RISC-processors and transputers. The chief idea of RISC is to select a minimal necessary number of instructions executed in one stroke and to achieve by means of all kinds of devices a maximum speed for each. Such processors are very difficult to program by hand. This will not apply to the overwhelming number of programmers, developers and all users, inasmuch as they will not be dealing with RISC processors but with that operational environment and those instruments and software which will be created for this processor. But there will be a need for those who will create this equipment. Inasmuch as such processors contain as a rule on a small chip an extremely fast temporary memory, one programmer that I know once remarked that "...the Risc processor is a kind of computer of the'50s, but only on a single chip. And it is quite possible that the experience of programmers of that time will be needed here who are able to work with a minimal selection of resources under tight conditions." The most encouraging thing is that these microprocessors, although they are completely 32-bit, are simple in production and severalfold cheaper than "regular ones" (naturally, also 32-bit, that is, 8-bit microprocessors have now long been one-third the cost of a pack of cigarettes). GAC Transputers are those some RISC processors, but with one significant addition. Each transputer can be directly connected to four (or less) neighboring transputers. At the same time, a transputer is not only able to transmit data but also commands, that is, control their work. PCs on the base/at the location of transputers can be unified into a comparable network/system. The difference from the regular computer network is that the whole network becomes a single computing system and operates as a single multiprocessor computer.

You turn on a program and after a while it spreads throughout the entire network and begins to live a very complex life. And not only you, but the developers of the system are not in a position to predict where and at what distance from you, in what PC and in what transputer, one or another computation took place. From the point of view the user, nothing will have changed. As a child drew an animated cartoon on a color screen or thought up an unusual timber for the voice of Zmeya Gorynycha, so it wil draw and invent. Except that there will no longer be 16 colors on the screen but several hundred thousand, and the quality of the picture will not be inferior to that in the movies. The chief difficulty facing developers is

that transputing systems require fundamentally new approaches to programming and possibly the creation of new mathematical theories and bases for programming.

Let me cite an interesting thought made by L. Malkov, a staff worker at the Central Mathematical Economics Institute of the USSR Academy of Sciences. In 1988 the sales volume of program products of Amereican firms amounted to 24 billion dollars, and it will continue to grow rapidly. The number of programmers in the USSR and in the United States is about the same. Were the USSR to occupy even 4-5 percent just of the American program market, this would be the equivalent of exports in the amount of 1 billion dollars. In case of success, we could occupy our niche in international division of labor, and then "they" would have a need for our ideas, our programs, our programmers, our information and our scientific experience no less than we have for their 32-bit computer, including portable computers, transputers, thermomagnetooptic and simply optic disks, laser and liquid-crystal printers, scanners, telefaxes and other daily and everyday things whose production, let us be honest, our industry will "never" master. (That is, mastery, of course, when they become obsolete or are no longer used).

Now as to why we have a chance.

The principal hope is based on the fact that these problems are more scientific and intellectual than technical. We have mathematicians, programmers, logicians and specialists for diffused sets and artificial intelligence who can work and do work in these areas (at Moscow State University, the Computer Center of the USSR Academy of Sciences and other places) and who are not averse to forging ahead. Especially if we permit them to work in close international cooperation. It is entirely possible that scientific cooperatives and joint enterprises will be found to be most suitable for this. It is important for many of them to exist and for them to be different.

The chief difficulty is that equipment is still necessary. And the most realistic way of obtaining it is through cooperation with Western firms. Information is needed. Very intensive contacts with Western colleagues are needed. And contacts running to absurdity, to the criminal (this is when a Soviet programmer invites a Western colleague to his home for a cup of tea with a cake baked by his wife without having asked for permission from UVS [expansion not provided] and without having written a report as to whether the cake came out well or not). We need mass landings of our programmers and specialists at Western universities, firms and laboratories. We need maximally facilitated forms of hiring of our programmers by Western firms for work on the basis of a contract. (How correctly A.A. Logunov, rector of Moscow University, noted in LITERATURNAYA GAZETA, "if some of them don't return, the devil take them!" And it would not be terrible if the results of their work at these firms does not become solely ours. More important is that experience which they acquire, those new ideas which will subsequently be here, those students and schoolchildren which they will train and that inexpressible aroma and fervor of international intellectual assault, cooperation and competition which can never be created by those who prefer "to hold and not let go."

Programmers and scientists are an intellectual resource, which fortunately is renewable. There is a shortage of programmers in the world. They will be increasingly in shorter supply. Let us become the country of the best programmers in the world!

Success of Temporary Computer Collective 'Start' Described

18140047a Moscow EKONOMICHESKAYA GAZETA in Russian No 34, Aug 88 p 21

[Article by correspondent N. Manuylov: "On the Approaches to a 5th-Generation Computer"; first paragraph is source introduction]

[Text] Our correspondent N. Manuylov describes the successful 3-year work of the first-in-the-country temporary scientific-technical collective called Start for the creation of a complex of the newest software.

In the "Start staff room," the office of Yevgeniy Pavlovich Kuznetsov, deputy head of the VNTK [temporary scientific-technical collective], we encountered a plain poster: "000 workdays left to startup." These three zeros did not merely symbolize the end of the VNTK's work but indicated something more—Start had completed exactly on the scheduled day a job which, in the opinion of specialists, under ordinary conditions would have taken an entire 5-year period.

Questions involuntarily questions arise: what was accomplished and how did it manage to be done in such a short period of time?

The interdepartmenal commission of the USSR State Committee for Science and Technology, the USSR Academy of Sciences and the USSR State Committee for Computer Technology and Information Science highly rated Start's work. In the acceptance act of the MARS system (such is the generalized designation of the chief aim of the VNTK's scientific-research and experimental design work), the significant scientific and technical achievements capable of providing a breakthrough in the field of development of computing equipment with record speed and intelligence capabilities are pointed out. They include, for example, the operative multiprocessor Mars-T complex, the first domestic system with transputer architecture. Simply put, the first superminicomputer has been created with a productivity of several million operations per second.

In explaining what it was, Ye. Kuznetsov said that the basis of the complex was 32-bit KRONOS microprocessors, which also were developed by Start. In addition, the

pipeline [konveyyernyy] Mars-M computer was created for the solution of complex scientific-technical problems. All this opens up new directions in the development of domestic computer technology.

Finally, the intelligent program systems have been acknowledged as original, significantly in advance of foreign systems in regard to a number of parameters. In particular, Start workers pointed out, a technology was developed of man intefacing with computers. These in essence are specialized factories for engineering computations, developments of computer-aided design systems and adoption of decisions in planning and management. The class of performed work is perfectly comparable to the world level and for some positions exceeds it.

This I dare say is a brief description of what the VNTK has accomplished in 3 years. There need only be added to what has been said that Start completed the state order in full and on time. Interest in these developments has already been displayed in CEMA countries and many firms in Italy, Austria, England and Finland, and a part of the innovations has already been accepted for production in our country as well.

A year ago, EKONOMICHESKAYA GAZETA (No 12) described in detail the problems, structure and directions of activity of the collective. Today in summing up is the right time to figure out how we managed to achieve such results.

In the opinion of the temporary collective's managers and specialists, success was predetermined by the actual form of organization and pay remuneration. Let us recall that Start was formed of highly qualified specialists of five leading organizations of the country in the field of information science and computer technology. Here staff members worked at the Computer Center of the Siberian Department of the USSR Academy of Sciences, the Institute of Cybernetics of the Estonian Academy of Sciences, and of Moscow, Kiev and North-Donetsk organizations. The scientific and technical collective was headed by Doctor of Physico-Mathematical Sciences V. Kotov, the deputy director of the Computer Center of the Siberian Department of the USSR Academy of Sciences.

Here there were none of the usual laboratories, sectors and departments. Consequently precious creative time was not lost on various kinds of agreements. At the same time, there were a mobile collective and clear-cut problems whose solution brought the end goal closer. When some specialists left on completing their work, new forces were brought in. The feasibility of such a maneuver played a positive role especially in bringing in young people. As considered by Start workers, the principal burden of the work was placed on their shoulders.

Each brigade completed its order and determined its coefficient of labor participation in development, but no one received a bonus prior to acceptance of a job. Its size was fixed for future use.

And now, when the work is completed, each person has earned on the average 3,000 rubles. In addition to the material, no less important is moral and professional recognition. Start has helped many students, graduate students and scientific personnel become established. They brought here their ideas, performed emergency mini-orders, grew, as they say, before one's eyes and bolstered their research abilities and their prestige. There can hardly be any doubt about the usefulness of such schooling and the effectiveness of the actual practical work of a quick solution of important state problems with the resources of such a collective as the VNTK.

Thus the work is finished and turned over. A set goal has been achieved, so what is next? The VNTK was created for 3 years. These have come and gone. And although in the act of the interdepartmental commission there is a clear statement that the VNTK has proved the effectiveness of the new organizational form of conducting scientific research, the actual temporary collective now no longer exists. Its members have returned to their posts. For example, the Novosibirsk group for the most part has become part of the Department of Systems Information Science of the Computer Center of the Siberian Department of the USSR Academy of Sciences.

"How to continue to exist? We began to be concerned with this problem as far back as a year ago," Ye. Kuznetsov states. "It became clear already at that time that we could not tarry. A breakthrough has been made, we have gained the first positions in a priority direction that is most important to the country. Now we need to marshal more powerful forces. New structures are needed so as to prepare by 1993, for example, an experimental model of a multimicroprocessor computer with transputer architecture and a performance of up to one million operations per second. Such work is fully worthy of a state order with an expanded group of participants for its execution.

Thus a goal for tomorrow can be seen. Are there already concrete proposals from former Start workers? Yes, there are. In their opinion, a scientific and technical complex is needed providing for the unification and cooperation of the forces of academic and sectoral science and industrial enterprises and an obligatory "region of introduction" for the VNTK. Such a plan has already been worked out and is being studied by interested parties.

One can understand the participants of the Start VNTK. After their first success, they do not want to be content with what was achieved so that a pause would ensue and drag on, so that people would lose their enthusiasm and faith in the tested path, so that the rhythm would be lost in which they lived and worked for three years.

And perhaps for this reason, with the disbanding of the Start VNTK, we have not given up. An analysis is going on of the acquired experience, the problems and ways of improving the creation and functioning of the VNTK and working out criteria of assessing the contribution of each worker. Finally, cost-accounting conditions dictate not only the necessity of simple duplication or transmission of accumulated experience and scientific and technical solutions but also require putting the entire work on a commerical basis both with domestic and with foreign clients.

In a word, the Start VNTK has become a successful start on the way of searching for new effective forms of management of science. Now it is all a matter of active dissemination of this experience.

(Nikolay Veniaminovich Manuylov—correspondent of EKONOMICHESKAYA GAZETA for Altay Kray and Kemerovo, Novosibirsk, Omsk and Tomsk oblasts.

Address of correspondent's office: 630076, Novosibirsk, Ulitsa Frunze, No 3, Apt 55. Telephone 22-44-68.)

State Policy on Disseminating S&T Information Needed

18140022a Moscow EKONOMICHESKAYA GAZETA in Russian No 33, Aug 88 p 17

[Article by Candidate of Chemical Sciences Oleg Valerianovich Kedrovskiy, chief of the Poisk Scientific Production Association of the State Committee for Inventions and Discoveries for the supervision of scientific and technical information and propaganda in the RSFSR, under the rubric "Scientific and Technical Progress: Economics and Management": "Information as a Resource of Development". Passage in boldface as published]

[Excerpt]

Wasteful Duplication

The lack of a broad view on the problem of the generation and use of information resources of development leads, as was said above, to serious omissions at all stages of the gathering of information "raw material," the preparation of the information product and services, and their implementation at the consumer's. Thus, at the stage of gathering the information on industrial output, standards, and conditions drops out.

The task of preparing information products is accomplished "in a scattered manner," in isolation of the preparation of related types of information. For example, the writing of surveys, encyclopedias, and reference works was unjustifiably separately from the information system.

At the stage of dissemination the making of all types of information completely available to specialists, who are simply not capable of "getting" to all the sources of the data which they need, materials, and publications, is not being ensured.

The USSR State Committee for Science and Technology, which was given the right only of the methods supervision of the information network, proved to be incapable of aiming its development and activity in a single direction and of ensuring the completeness and topicality of the information being gathered.

The lack of organizational and technological unity in the activity of tens of institutes and centers of scientific and technical information is one of the main causes of our failures in the development of the state system of scientific and technical information. The attempt to use extensively in their work advanced means of automated information processing does not solve the problem, but, on the contrary, merely aggravates the shortcomings that are inherent in this network. The point is that the wasteful duplication of computer information files succeeded the manifold duplication of document collections. It is "eating up" a large portion of the assets, which are being allocated in the country for the automation of information processes. Practically the same units of information, which have been accumulated over the last 3-5 years, are being repeated at least three times in the data banks of all-union, sectorial, and republic information centers. And this is given the fact that the all-union bank and the sectorial banks are located next door to each other in Moscow.

What Is To Be Done Under the Conditions of Cost Accounting?

The lack of a unified state policy and concerted actions in this area especially made itself felt during the period of the changeover of industry and science to the new conditions of management.

The changeover, for example, of scientific organizations to full cost accounting and self-financing placed institutes and centers of information in a difficult position. In the well-known decree of 30 September 1987, "On the Changeover of Scientific Organizations to Full Cost Accounting and Self-Financing," unfortunately, the principles of the transfer and dissemination of scientific and technical knowledge and information were not specified and the differences between information and the scientific and technical product were not established.

As a result a parallel between the scientific and technical product and information is not always drawn in a justified manner by enterprises and organizations and the advisability of the state registration of scientific and technical results is being called into question. Many enterprises and organizations have already ceased to

transfer the results of scientific research and experimental design work and information on scientific and technical achievements and production know-how. There is a real danger of the significant worsening in the immediate future of the system of the intersectorial exchange of data and the completeness of information resources due to the decrease of information on domestic scientific and technical achievements.

The formed situation requires urgent steps on the specification at the state level of the basic principles of the gathering, processing, and dissemination of scientific and technical knowledge and information under the new conditions of management. It is necessary to envisage the retention of preferential conditions for the obtaining of needed knowledge and information by all interested personnel of science and production. It must not be forgotten that thousands and thousands of specialists should receive information on the scientific and technical product not for its use in practice, but for cognitive purposes, for the evaluation and generalization of the trends of development of the sectors of technology and industry. And one must not permit the worsening of the exchange of information in this area.

The new conditions of management at institutes and centers of information should be combined with a state policy, which is aimed both at the moderation of the increase of prices for the information product and services and at the mandatory transfer to the information system of an adequate amount of information on scientific and technical results, which can be transferred to all interested organizations and enterprises.

It is necessary without delay to specify clearly the range of the information product and services, which can be grouped with the scientific and technical product, and to develop a flexible system of the pricing of other types of the information product.

There are no doubts that with the consideration of the specific nature of the information sphere the changeover of institutes and centers of scientific and technical information to the new conditions of management will be beneficial. The results of the economic experiment of the intersectorial territorial centers of scientific and technical information and propaganda, which are located in Irkutsk, Leningrad, Sverdlovsk, Chelyabinsk, and Ufa and since 1 July 1987 have been working under the new conditions, also testify to this. (This was told about in detail on the pages of EKONOMICHESKAYA GAZETA, No 2, 1988.) A sharp growth of the labor productivity of personnel and an increase of the quality of information services exist there.

It is necessary, in our opinion, to transform the existing information network and the specialized sector of the national economy, which is capable of providing all enterprises and organizations of the country with rapid, goal-oriented, and full information. Here the interests of society in the free dissemination of information on the development of science, technology, and production should be taken fully into account.

Poor Record for Publications in Theoretical Physics Described

18140022b Moscow IZVESTIYA in Russian 16 Sep 88 p 2

[Article by Academician V. Ginzburg and Candidate of Physical Mathematical Sciences P. Volkovitskiy under the rubric "Problems and Opinions": "Why They Do Not Quote Us"]

[Text] Unfortunately, in basic science it is not easy, as a rule, to judge results. But still, specific methods of objective evaluation also exist here.

Recently a group of Japanese physicists made an attempt to evaluate the successes of the leading institutes of the world in the field of theoretical high energy physics, which studies the structure and interaction of elementary particles. The achievements in theoretical high energy physics are one of the important components of the culture of modern society. A significant portion of the Nobel Prizes in Physics are awarded for research in this field.

The method, which the Japanese researchers used, in principle has been well known for a long time—the number of references to the scientific publication of one author or another is calculated. This, when a sufficiently large interval of time is taken for the analysis (of course, self-quotation, references of the author to himself, is excluded), can serve as one of the objective criteria of the importance of a work.

Mainly the library of preprints of the Stamford Center in the United States was used for the analysis. The largest computerized catalog on research in the field of high energy physics is located here. A preprint is the rapid publication of the work of an author, which is carried out by the forces of the institute at which he works. A preprint is not considered an official publication.

Thus, the references in preprints to articles, which were published in English-language journals, for the period from 1974 to 1986 were analyzed. A number of Soviet journals, which are translated abroad into English, are also among these journals.

In all about 400,000 references to approximately 30,000 works were processed. The institutes, from which in 12 years more than 90 preprints arrived at the Stamford library and at the same time the associates of this institute published in 12 years more than 100 articles on theoretical high energy physics, were examined.

In all in the world 129 institutes, which meet the mentioned requirements, are working in this field of science. Of them 6 are in the USSR (for comparison: 16

are in Italy, 44 are in the United States). These are the Joint Institute for Nuclear Research in Dubna (OIYaI), the Institute of Theoretical and Experimental Physics in Moscow (ITEF), the Institute of High Energy Physics near Serpukhov (IFVE), the Physics Institute of the Academy of Sciences in Moscow (FIAN), the Institute of Theoretical Physics of the Ukrainian SSR Academy of Sciences in Kiev (ITF), and the Leningrad Institute of Nuclear Physics (LIYaF). Let us take such an indicator as the average number of references to an article. On the average for all 129 world centers it comes to 12.2. For Cornell University of the United States it is 43.4, for Ecole Normale (France) it is 40.2; for Princeton University (the United States) it is 39.8.

What are our indicators? The Institute of Theoretical and Experimental Physics—17.8; the Physics Institute of the Academy of Sciences—14.7; the Leningrad Institute of Nuclear Research—6.3; the Joint Institute for Nuclear Research—2.5; the Institute of Theoretical Physics—1.9; the Institute of High Energy Physics—1.1. The results of the research also testify that we have few scientific centers that are making an appreciable contribution to the world "bank" of preprints. A number of institutes and higher educational institutions, at which they are dealing with theoretical high energy physics, did not get on the cited list only due to the low level of their publishing base and due to bureaucratic complications in case of the publication of preprints.

At the same time the reaction to these works of Soviet authors, which have been published in English, arouses anxiety and is surprising. The "efficiency" of Soviet works is less, and at times significantly less, than that of works that come from the best world centers. Thus, of the works on theoretical high energy physics, which are published at the Institute of High Energy Physics, 79 percent are not cited at all. For the Physics Institute of the Academy of Sciences this figure comes to 31 percent, which is also substantially higher than for the best institutes abroad (10-12 percent).

By what is such a situation explained? The possible reasons are: the not so high quality of a number of works and their inadequate topicality. The lack of sufficiently close and numerous contacts between many Soviet and foreign physicists also plays a role.

How is the situation to be changed? First of all one has to eliminate the obstacles in the way of the quick publication and distribution of preprints at many of our institutes and higher educational institutions. Moreover, we need to publish more extensively ourselves articles in English.

It is especially important to lift without delay the artificial barriers that prevent the sending of articles of Soviet authors to foreign journals. For example, the now prevailing requirement on the registration at the All-Union Copyright Agency of articles, for which royalties are not paid and which make up the overwhelming majority of scientific publications, is simply absurd.

In many countries in case of the certification of national scientific personnel and the awarding of prizes they use expert evaluations of not only their own, but also foreign scientists, as well as the published index of the rate of citation of the works of the person being certified. It is also necessary to introduce this practice in our country. In particular, this pertains to the discussion and awarding of prizes in science, including Lenin and State prizes.

Status of S&T Work in Belorussian Agriculture

18140045 Minsk KOMMUNIST BELORUSSII in Russian No 7, Jul 88 pp 24-28

[Article by Corresponding Member of the Belorussian SSR Academy of Sciences I. Nikitchenko, deputy chairman of the Belorussian SSR State Agroindustrial Committee: "The Scientific Support of the Agroindustrial Complex"]

[Text] The thoroughly considered program on the improvement of the education and training of young people, which was adopted by the February (1988) CPSU Central Committee Plenum, prompted us in many respects to look in a new way at the real state of affairs in our agricultural science. In spite of the reserve available here, which in many directions is significant, it has so far not become a decisive productive force. It is no secret to anyone that many questions of the support of scientific and technical progress in the agroindustrial complex were settled and today are still being settled not in the way that the times and the new moral and political situation require.

In the work of the scientific research institutions of the Belorussian SSR State Agroindustrial Committee, unfortunately, other major shortcomings, which at times reduced their efforts to naught, also occurred. This is first of all the unsatisfactory comprehensiveness of developments and the focus on petty topics. Thus, the research plans of republic institutes for the 12th Five-Year Plan were formulated on the basis of 20 all-union scientific and technical programs of the USSR State Committee for Science and Technology, 29 sectorial programs of the USSR State Agroindustrial Committee, and 11 republic and 10 sectorial comprehensive goal programs of former ministries and departments, which were included in the Belorussian SSR State Agroindustrial Committee. On the average each institute accounts for seven programs and more each. Moreover, each republic scientific research institution watches over five to six organization-coordinators from among union institutes, each of which presses its own minor questions. As a result the plans of scientific research work proved to be so disunited that one need not expect from them a serious integrated development. Thus, for example, in accordance with the plan for 1987 it was necessary to complete the work on 104 themes. However, in 37 of them, even given the richest imagination, it is difficult to determine the subject of introduction. While individual themes, for example, the development of a technology of the pen housing of suckling meat cows under the conditions of Belorussia, are simply absurd.

It is also impossible to pass over in silence the shortcomings of introduction. Until this year it was planned in the indicators of the national economic plan and in so-called scientific and technical programs. If in the former case even not a complete technical base was placed under the work being planned, nothing was allocated for the programs, but it was necessary to give an account for this "nothing." Therefore, documents on the estimated economic impact, which was not confirmed by anything, but regularly appeared in reports, were frequently drawn up. The initiators of this illusion—the Science Department of the Belorussian SSR State Planning Committee and executives of the corresponding departments and administrations of former ministries—were content with such a state of affairs, there was no benefit from this for agricultural production.

Of course, all this aroused concern. Recently on the initiative of party and soviet organs the optimum tasks and specific means of restructuring the scientific support of the development of the agroindustrial complex of the republic were specified. The carefully weighed and thoroughly studied measures affect practically all aspects of scientific and technical progress, including planning, the financing of science, the methodology of research, personnel questions, the remuneration of labor, material stimulation, and the organization of introduction. With allowance made for the instructions of the CPSU Central Committee Plenum this spectrum of problems will be persistently and consistently realized.

A transition has already been made to the goal program method of the planning of scientific research and introducing work, which envisages the conclusion of turnkey contracts for the solution of specific scientific and scientific production problems with the clear specification of the deadlines, performers, assets, material and technical resources, and the end result as a whole or by stages. State orders for the development of science and technology, the assignments of state scientific and technical goal programs, and the orders of the sectors of the agroindustrial complex of the republic were made the basis for the planning of scientific research work. They are interconnected in 15 sectorial scientific and technical programs: "The Increase of Soil Fertility," "Grain," "Fodder Production," "Flax Growing," "Sugar Beets," "Potatoes," "Vegetables," and others.

The implementation of the named programs will make it possible to elaborate a set of steps on the increase of soil fertility, which ensure the obtaining per hectare of plowland 80-85 quintals of fodder units, to develop more than 30 new high-yielding strains and hybrids of agricultural crops, which are resistant to diseases and pests, and to achieve by 2000 a potential yield of cereals in the range of 70-75 quintals per hectare, legumes—40 quintals per hectare, potatoes—450-500 quintals per hectare, and vegetables—400-450 quintals per hectare. Zonal types of dairy cattle with a productivity of 6,000-7,000 kilograms of milk a year and meat cattle with a growth rate of young bulls in fattening of 1,200-1,500 grams a day with expenditures of 6-6.5 fodder units per kilogram of weight gain and highly productive breeds of hogs will be introduced.

For the complete mechanization of agricultural processes a zonal system of machines, which decreases labor expenditures by more than 60 percent, the specific

consumption of fuel by 22 percent, and the materials-output ratio of machines and equipment by 20 percent, is being established. As a result of these steps the level of mechanization will increase by 20-30 percent and labor productivity will increase by 80-90 percent. Promising systems and hardware (more than 30 units) for the processing of agricultural products, which ensure the expansion of the assortment, a 25-30 percent increase of the output of products per ton of raw materials, and a two- to threefold increase of labor productivity, are being developed and are already being introduced.

In accordance with the programs it is planned to make the latest achievements in the field of biotechnology, electronics, physics, mathematics, and other basic sciences the basis for the methodology of research. Biotechnological research will be developed in several directions. The first is the increase of natural fertility by the microbic synthesis of atmospheric nitrogen. This will make it possible without detriment to intensive technologies of the cultivation of agricultural crops to decrease the amount of mineral nitrogen, which is not converted completely by plants and turns in the body of man and an animal when exposed to special enzymes into nitrates. And, consequently, with time they diminish in products, which in itself is very important.

Microbiological means of increasing the digestibility of coarse fodders by ruminants are the second direction of research. This work is of enormous economic importance. The point is that the basic nutrients of coarse fodders are contained in a lignin membrane and in practice are inaccessible to an animal. Therefore, their digestibility does not exceed 50 percent, while that of hay made from overmature grasses and straw is even lower. This leads to enormous losses of nutrients, but, after all, in the content of chemical elements and energy a kilogram of grain and a kilogram of straw are equivalent. Scientists have proven that it is theoretically possible to develop such races of bacteria, which are capable of destroying the lignin membrane and thereby of ensuring the access of the digestive juices of an animal to the nutrients. The increase of digestibility by just 1 percent is equivalent to the harvesting of fodders, given the present yield, from an area of more than 17,000 hectares.

The third direction is cytoengineering in animal husbandry. The transplantation of embryos increases the multiplication ratio of large horned cattle by fivefold and more. But it is also possible to increase this result significantly (by another four- to eightfold) by the artificial fission of one zygote by a surgical method. Moreover, at present the problem of the efficient control of the heredity of animal organisms faces scientists. The most practicable means of achieving this goal is the surgical transplantation of the nuclei of somatic cells into any embryo from an animal of the necessary quality. In this case the born young animal will have about 90 percent of the heredity of the animal, from which the nucleus was transplanted.

The work on microclonal methods of reproducing plants will be continued and intensified. The method of the meristematic reproduction of potatoes, which makes it possible to obtain seed stock that is immune to many diseases, for example, has already been used in practice.

A special place is being assigned to the basic principles of intensive nature conservation technologies of the production and processing of agricultural products. First of all we consider it necessary to have an effective system of the protection of plants based on biological methods, as well as herbicides of plant and microbic origin. This will make it possible to reduce to a minimum the use of protective agents that have an adverse effect on the environment. It is intended to have all biotechnological research conducted in accordance with a single program by scientific institutions of the Belorussian SSR Academy of Sciences and the republic State Agroindustrial Committee.

The advanced form of the remuneration of the labor and the stimulation of scientists will affect most directly the increase of the efficiency of science. Under the new conditions for the first time differentiated salaries are being made directly dependent on the end results and personal contribution of each person. The managers of scientific research institutions now have the right to establish, in case of a saving of the wage fund, increments for scientists for the performance of the most difficult and responsible jobs in the amount of up to 50 percent of the salary and for other highly skilled specialists and employees in the amount of up to 30 percent for the period of the fulfillment of the jobs. The indicated increments are canceled or reduced in case of the failure to observe the deadlines of the completion of the work or its individual stages, in case of its unsatisfactory quality, as well as in case of the violation of labor and production discipline.

As of this year the scientific institutions of the Belorussian SSR State Agroindustrial Committee have been changed over to full cost accounting and self-financing. All nine of our scientific research institutes, six oblast and two zonal experimental stations, four planning institutes, one planning and design institute of automated control systems, a special design bureau with a pilot works of the Minskplodoovoshchprom, and the Belpishchepromtekhnika Scientific Production Association with a total of about 4,000 workers are encompassed by the innovation. The new economic mechanism in their work, in my opinion, will undoubtedly become the main economic lever of extensive scientific and technical progress. Now they are covering their expenses first of all by means of the assets earned in the sale of developments to consumers. The scientific institutions make products to the order of the state and in accordance with orders of individual enterprises and organizations. In the former case research is performed in conformity with supply orders, which have been concluded with the sectorial main administrations of the agroindustrial complex, and is financed by means of the internal and centralized

assets of the agroindustrial complex or budget assets, which are allocated to the Belorussian SSR State Agroindustrial Committee by union organs. The scientific research work in the highest priority directions of a basic and applied nature, which is, as a rule, of all-union or regional importance, is grouped with such orders. The scientific and technical product, which is produced in such a manner, is the property of the state.

In the latter case the research is launched in conformity with contracts that have been concluded between economic organizations and scientific institutions on the basis of cost accounting relations. Contract prices for the devising and introduction of one development or another are used for increasing the responsibility and economic interest of the parties.

From what has been said it is obvious that the scientific and technical product is becoming a commodity, while the profit is becoming the basic source of stimulation of the organization that produces it.

A number of organizational and functional steps were taken for the purposes of the restructuring of agrarian science and its more active influence on the rapid development of the sectors of the agroindustrial complex of the republic. For example, 11 scientific production associations for agriculture are already operating. Centers of scientific support attached to the Belorussian SSR State Agroindustrial Committee and to the agroindustrial committees of oblasts, within which there are scientific research institutions, higher educational institutions, and other organizations of science and information services, regardless of their departmental subordination, have been established for the close integration of science with production. The interrelations between them are regulated by the principles of cost accounting.

The very direct appeal "to introduce" in the recent past was not backed by anything, no one was interested in increasing the level of scientific developments and the efficiency of their use. And it was heard for the sake of fashion, for effect. But under the conditions of the evaluation of the results of the activity of farms from what had been achieved no manager strove for the rapid increase of the output of products, inasmuch as, having developed his own potential in a short time, he actually deprived the farm of the opportunity in the future to obtain markups. At times in the total amount of the profits they took up about one-third. Therefore, what is called the "proportional" method of introduction, in case of which not the rapid realization of possibilities, but the assurance of a specific increase, which guarantees in case of the minimum efforts the maximum benefits in the form of markups, was taken into account, was popular among managers. Scientists were also not too interested in this matter. Only individual enthusiasts attempted persistently to breach the mechanism of deceleration. The others, having run into a wall of incomprehension, lost heart, without ever deciding to cross this kind of right of way. And why fray their own and others' nerves, when their personal well-being also did not depend on the quality of developments and the volumes of introduction.

Now the situation is changing drastically. And it is changing for the better. A network of production and scientific production systems, through which science is directly closed in the sphere of production, turning into the main—and this is extremely important—motive force of the rapid development of all its sectors, is being formed.

The scientific production (production) systems are voluntary organizations, which are established by scientific institutions, experimental bases, and leading farms. They organize their work on a contractual basis, while assets are formed only by means of the sale of the additional output, which is obtained from the use of new technologies and equipment. The participants in the system have the right to conclude contracts with any scientific institutions for the purchase of developments and for the introduction of technologies with any kolkhoz and sovkhoz.

The Zerno, Travy, Kartofel, and Len scientific production and production systems—for the growing of elite seeds of cereal and leguminous crops, perennial grasses, potatoes, and flax and for the introduction of technologies of their cultivation; the Plodovodstvo system—for the production of nursery plants of fruit and berry crops; systems for hog breeding and dairy cattle breeding, and others are presently being established.

The duties of the organizations, which belong to the system, on the implementation of specific stages of scientific and technical progress have been efficiently distributed. Republic scientific production associations develop and adjust at their own bases intensive technologies, after which they are offered for introduction to oblast scientific production associations or systems. The latter after the production checking of proposals under the conditions of the oblast jointly with the management of the oblast and specialists determine their applicability for production. In the event of a positive decision the oblast scientific production association purchases from the developer his development and through the production systems organizes its introduction in the practice of kolkhozes, sovkhozes, and processing enterprises.

Thus, intensive technologies of the production of agricultural crops and the products of animal husbandry, as well as advanced technologies of their processing will be the basic object of introduction.

One of the most urgent questions of the development of science is personnel policy. It is no secret that the collectives of institutes "are growing old," the influx of young forces is relatively small. The low wage at scientific institutions (on the average about 140 rubles) and

the lack of any stimulation whatsoever have made agricultural science an unprestigious sector of the national economy. As a result in the past 15 years the plan of recruitment for graduate studies has not once been fulfilled. Even competition was lacking in case of admission.

It has to be stated that mainly graduates of higher educational institutions or specialists, who did not get accustomed to production, enrolled in graduate studies. And here is the result. The average age of doctors of sciences, and we have 50 of them, now comes to 60, that of candidates of sciences, the number of whom comes to 812, is 50, and that of junior scientific associates is 38. That is, in essence there is no sound replacement of the older generation. For an associate, who "has gotten stuck" at the rank of junior associate by the age of 40, as a rule, will not be able in the future to give anything to either science or production.

The improvement of the system of the training of scientific personnel is now under way. By 1992 it is planned to develop graduate studies at all scientific research institutes and doctoral studies at the leading institutes. The training of specialists of the general type has been curtailed and admission has been expanded in promising directions—biotechnology, automation, computerization, and robotization. The material interest of students in graduate studies is increasing—the stipend will be raised to 150 rubles a month, while the salary at the former place of work is being retained for a portion of the graduate students (the number of such stipend holders will be reported to the republic by the USSR State Agroindustrial Committee). This, it seems, will attract to science capable young people, who have the appropriate production experience and an aptitude for scientific work.

Everything presented here, in my opinion, should be regarded as a priority program of the restructuring of the scientific support of the development of the agroindustrial complex of Belorussia. With its implementation and the gaining of new knowledge adjustments will be made in the operational plan in order to guarantee rapid scientific and technical progress in all the sectors of the agroindustrial complex.

Kolbin Speech at Kazakh Academy of Sciences General Session

18140039 Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 7, Jul 88 pp 52-59

[Speech by First Secretary of the Central Committee of the Communist Party of Kazakhstan G.V. Kolbin at the 21 April 1988 General Session of the Kazakh SSR Academy of Sciences: "The Tasks of Kazakhstan Science During the Period of Restructuring"]

[Text] The present stage of development of the republic, just as the entire country, is characterized by profound, truly revolutionary changes in all spheres of social life without exception. The ideas of modernization, which were advanced by the party, have enriched the intellectual potential of the people and have opened the way to new political and economic thinking. Under these conditions the real prerequisites for the decisive surmounting of the obstructions and obstacles, which are still slowing the ascent of Kazakhstan science, and for a broad breakthrough in the priority directions of basic and exploratory research have appeared.

The vast historical experience of the formation of our republic on the firm foundation of socialist internationalism is providing self-confidence and confidence in the inexhaustible creative possibilities, which have to be revealed and placed in the service of restructuring. During the years of Soviet power with the comprehensive assistance of all the fraternal peoples Kazakhstan has made significant gains in economic, social, and spiritual development. Now the republic is a major industrial-agrarian region. A genuine cultural revolution has been accomplished, the scientific and creative intelligentsia has formed. This appraisal was voiced in the well-known decree of the CPSU Central Committee on the Kazakh Republic Party Organization. And that is why for us it is especially high and significant. In it there is recognition of the significant contribution of Kazakhstan to the all-union treasure of material and spiritual achievements. In it there is recognition of the diverse talent of the Kazakh people, of whom we have the right to be proud. Their authority long ago crossed the intranational boundaries. With good reason it can be said that the talent of the Kazakh people has become the property of all mankind, a particle which has enriched human culture.

The names of Zhaniya Aubakirova, Ayman Musakhodzhayeva, Roza Rymbayeva, Alibek Dnishev, and many other representatives of the original art of Kazakhstan are well known far beyond the republic. We proudly refer to the names of our compatriots, the diplomats M.S. Fazylov, A.I. Amangaliyev, D.A. Baydildin, and Kh.R. Omarov, who worthily represent the country on the international arena.

Science of the republic is also rich in genuine talented people. The international traditions of mutual assistance and mutual rapprochement, which are the basis for the fraternal cooperation of all the Soviet peoples, appeared especially vividly precisely in this sphere. For prominent scientists of different nationalities were at the source of academic science of Kazakhstan. These are Academicians A.D. Arkhangelskiy, A.N. Samoylovich, A.Ye. Fersman, I.M. Gubkin, and B.A. Keller, Professors Ye.F. Luskin, S.D. Asfendiarov, and M.N. Tulepov, and others. Owing to their efforts the Kazakh Affiliate of the USSR Academy of Sciences developed into a large scientific center which united the best forces of research scientists and experienced specialists. While during the years of the war, when the republic took under its roof such prominent scientists as I.I. Meshchaninov, L.I.

Prasolov, A.S. Orlov, M.M. Zavadovskiy, N.N. Baranovskiy, and A.V. Dumanskiy, new institutes—the institutes of astronomy and physics, power engineering, zoology, physiology, history, archeology and ethnography, language and literature—were opened here.

Such a rapid buildup of the scientific potential made it possible already in 1946 to open the Kazakh SSR Academy of Sciences. Scientists, whose memory will remain forever in our hearts, were members of its first staff. These are M.O. Auezov, A.B. Bekturov, I.G. Galuzo, M.I. Goryayev, A.K. Zhubanov, N.G. Kassin, S.K. Kenesbayev, N.V. Pavlov, M.P. Rusakov, N.T. Sauranbayev, G.A. Tikhov, V.G. Fesenkov, S.V. Yushkov, and, of course, the first president of the academy, Kanysh Imantayevich Satpayev.

One of the most noteworthy pages in the history of Kazakhstan science is connected with the name of K.I. Satpayev. And not only science, because the beneficial influence of his inspired personality also told noticeably on the prospering of the culture and the entire intellectual life of the republic.

The scale of the scientific and moral feat of the prominent son of the Kazakh people, the 90th anniversary of whose birth will be celebrated in a year, still has to be comprehended and appreciated. The preparation for this anniversary, as well as the implementation of the decree on additional measures on the perpetuation of the memory of Academician K.I. Satpayev, which was adopted by the government of the republic, it must be assumed, will make it possible to reveal more thoroughly the self-sacrificing essence of the noble activity of the scientist and to lift, at last, the cloak of the artificial hushing up of his services to domestic science.

Today, when the time of sober evaluations and the sharp turn of social consciousness toward the real priorities has come, it is also very important to understand why the solid foundation of scientific knowledge, which was laid by K.I. Satpayev and his associates, began subsequently to crack. Why did the moral distortions, which often turned creative scientific activity into utilitarianism and science into a mean of satisfying personal vanity and of achieving selfish, egotistical goals, prove to be possible? One should seek the answers to these "sore" questions in the moral and psychological state of public life, which has formed in the republic in recent decades. A set of negative phenomena of the period of stagnation and, in particular, the gross errors, which were made in personnel policy, were the reason for this. In the decree of the CPSU Central Committee "On the Work of the Kazakh Republic Party Organization on the International and Patriotic Education of the Working People" it is directly indicated that "...in case of selection and promotion to a management job not political, business, and moral qualities, but national affiliation, family and local ties, and personal loyalty were often the decisive factors."

It is no secret that in scientific surroundings such "methods" of placing personnel became especially widespread. Factionalism and mutual guarantee, which entailed bribery, protectionism, and the moral degradation of a portion of the scientists, became most firmly rooted precisely here. Moreover, a situation of permissiveness and impunity was created for a specific circle of people, who are relatives or favorites of the former first secretary of the Central Committee of the Communist Party of Kazakhstan. The personal and group interests of these people—former executives of the academy—became an insurmountable obstacle for a genuine talented person, but, when it came to a "needed" person, all obstacles were eliminated, as by the waving of a magic wand. Rewards, positions, and high academic titles were given out in accordance with the clan laws of protectionism.

Thus, on the suggestion, and more correctly speaking, on the instructions of former academy president A.M. Kunayev Z.A. Akhmetov, Sh.Sh. Ibragimov, and others were promoted to management positions. The question arises: For what services? If they did exist, they were far from scientific. For example, Z.A. Akhmetov in just 8 years had the honor of becoming the director of an institute, academician secretary of the Social Sciences Department, and, finally, vice president of the academy, although he was by no means conspicuous for organizing abilities. While merely the fact that at one time he was the scientific supervisor of the son of A.M. Kunayev, commenced this truly fantastic rise.

The fact that during the 12 years, which Sh.Sh. Ibragimov spent in the positions of vice president of the academy and director of the Institute of Nuclear Physics, all his "work" consisted in the pushing of unique imported equipment, which was obtained by the republic, through to only "family" institutes, testifies eloquently to his business qualities.

However, having gotten to the bottom of the subtle mechanics of the successes of the promoted workers and having understood the methods, which enabled them to rise so high, is it possible to say that the conditions, which gave rise to them, have been completely eliminated? It seems that they have not been completely eliminated. For example, the system of the suppression of glasnost and democratic principles when nominating candidate members of the academy is still in operation. It is a question of the supplement to the charter section on the procedure of electing full members and corresponding members of the Kazakh SSR Academy of Sciences, which was adopted in 1969 and gives the Presidium the right without consideration of the opinion of the scientific community at large to settle in secrecy the questions of the nomination of some candidate academicians or others. Is this really not a hidden channel of the obtaining of titles and honors, which at times are undeserved? Is it really not a loophole for

unconscientious people? Nevertheless, in spite of many years of protests of principled, honest scientists, the obsolete supplement to the charter firmly remains.

It is necessary as quickly as possible to get rid of the burden of the moral costs of past years and to resolutely eradicate the factors, which gave rise to the deviations from the Leninist principles of the work of collective organs and the most gross violations of party, state, and financial discipline and literally undermined the ethical foundations of Soviet science. Must it be said what enormous harm they did and how many fresh ideas, original developments, and new discoveries were "buried"! Actively defending their questionable right to be at the helm of the academy, its former executives consciously hindered the advance of talented young people. Suffice it to say that young scientists now make up only 8.7 percent of the total number of candidates of sciences. And where were they to come from, if during 1981-1985 of 680 graduate students only 50 defended dissertations on time? However, no scientific supervisor was responsible for such, if one may say so, "quality" of his own work. Moreover, very often the places in graduate studies were occupied on account of patronage, and not abilities and talent. In this connection an entire generation of young scientific personnel was practically lost, and this criminal irresponsibility for a long time yet will affect the efficiency of the work of the academy.

At the same time the substantial aging of the active staff of the highest skills—doctors of sciences—which, unfortunately, has also seized hold of the reserve for their training—the corps of candidates—is being observed. Is it really possible to recognize it as normal that for 1988 the Academy of Sciences did not announce a single place in doctoral studies, but in the draft of the plan for 1989 showed a need for eight places, including four in the philosophical sciences?

The general state of affairs is now such that the academy is experiencing an acute shortage of scientists who are capable of heading new scientific directions that ensure the priority of Kazakhstan science. Nearly 50 percent of the members of the academy do not work at its institutions, while several have never worked and lived at all on the territory of Kazakhstan.

What is being do to improve the formed situation, so that the work of the republic Academy of Sciences would satisfy completely the requirements of the 27th party congress and the subsequent CPSU Central Committee Plenums and the requirements of restructuring? For the present it has to be stated that the changes made in the structure of institutes and the revision of research themes were not radical and are not making it possible to concentrate the efforts of scientists on the main directions. If only the fact that the State Plan of the Development of Science and Technology for 1987 was not fulfilled by the academy, while the share of the expenditures in the total amount for scientific research with respect to all-union scientific and technical programs and problems in the area of the natural and technical sciences came to only 20 percent, testifies to this.

The institutes of the academy, being the head organizations for the majority of republic programs, are not ensuring the proper monitoring of the quality of the development being conducted and its introduction in production. Research on the Ili-Balkhash problem is being conducted with a lag, academic institutes are slowly joining in the solution of the problems of developing the Caspian Petroleum- and Gas-Bearing Region. Ecological themes, which are extremely important under the conditions of Kazakhstan, are literally "scattered" among many scientific institutions and in practice are not being coordinated by anyone.

It is clear that it is difficult to solve chronic problems quickly, especially in science. Systems development and painstaking preparation for the accomplishment of large-scale tasks are needed. It is felt that the new management of the academy sees the priority goals and is persistently laying the optimum paths to them, but, as they say, things are still far from good. The concerted efforts of different magnitude of all the subdivisions and all the members of the collective of many thousands of the headquarters of republic science are necessary in order to obtain real results. This concerns, first of all, several most important tasks for the republic, which are of not only economic, but also enormous political significance. As is known, in the decree of the CPSU Central Committee on the Kazakh Republic Party Organization it was correctly indicated that at the turn between the 1970's and 1980's the contribution of the republic to the unified national economic complex of the country began even more not to conform to its increasing economic and scientific potential. Static phenomena encompassed all sectors of the national economy, the rate of production decreased drastically, the qualitative indicators of the development of the economy worsened. During the past two five-year plans we had the lowest growth rates of the national income and labor productivity in the country.

The obsolete structure of social production of the republic, which does not conform to the spirit of the times, is one of the factors, which caused negative phenomena and, as a consequence, the decrease of the standard of living of the people. The predominance of the extractive sectors has turned Kazakhstan primarily into an enormous raw material base with quite undeveloped machine building and a quite undeveloped electronics and other science-intensive industry. Hence the insufficiently high national income, surplus manpower resources, the low popularity among young people of the available working class occupations, and a large number of other social problems.

The Central Committee of the Communist Party of Kazakhstan and the republic government have resolutely adopted the policy of improving the formed situation, but it is impossible to manage here without the effective

assistance of science. In connection with the change of the structure of industrial production it is important to reorient in a sound and responsible manner the existing priorities of basic and applied research toward the quickest solution of urgent and long-range problems of the sectors of the national economy, which are being newly formed. First of all the group of research, which is connected with science-intensive production, including the electronics and radio engineering industry, modern machine building and instrument making, and biotechnology, belongs here. Special attention should be devoted to the questions of the intensification of production, the changeover to continuous production processes, and the reduction of manual labor. It is also important to concentrate scientific forces on the solution of the problems of the development and extensive introduction of automatic and semi-automatic equipment, the optimization of production processes with the use of computers, the decrease of the specific indicators of the metal content, power consumption, and cost per unit of the ultimate effective impact, the development of resource-saving technologies, and the use of nontraditional energy sources. In this connection it is deemed expedient to accompany the increasing demands on the efficiency of the work of scientific institutions with the significant strengthening of their material and technical base. By 2005 the capital investments in science will have increase by 1.7-fold and will reach 100 million rubles, moreover, the share of investments in the development of the pilot experimental base will amount to more than half of these assets. For this period a nearly twofold increase of the number of scientific personnel in the system of the Academy of Sciences is also envisaged.

However, in thinking about the prospects, it is necessary to lay their foundations now. First of all this concerns the establishment of scientific schools, the attraction for this of prominent scientists from other union republics, as well as the provision of the necessary conditions for the advancement and attachment of our own talented researchers. For the present the opposite is happening: many well-known Kazakh scientists prefer to work "on the side" and are finding recognition and prestigious work outside the republic.

Undoubtedly, you feel a legitimate sense of pride when our countrymen, as, for example, physicist G. Abel or mathematician A. Meyrmanov, are highly regar prominent union scientific organizations. But do there not lie behind this, at least in individual cases, our lack of attention to them and the inability to support and give assistance in time to a young promising scientist, so that here, in Kazakhstan, scientific schools, which acquire not only union, but also world fame, would grow and become strong?

One should think over well and agree more boldly to the development of new advanced forms and organizational structures and to the integration of science and production. These are cost accounting introducing organizations, scientific engineering centers, temporary scientific collectives, which are established for the solution of the most important scientific and technical problems, and educational scientific production complexes, in which the interests of production, VUZ and sectorial science, and the training of personnel with the prospects of the development of basic operations under the aegis of the Academy of Sciences would be taken most completely into account.

In short, it is time to change over in practice from the already obsolete principle of the financing of scientific organizations to the financing of specific studies, themes, and developments, that is, to the realistic evaluation of the labor, which has actually been invested in the common cause, and the talent of each scientist.

Great and responsible tasks, which follow from the decisions of the 27th party congress, the February (1988) CPSU Central Committee Plenum, and the speech of M.S. Gorbachev at the All-Union Conference of Heads of Faculties of the Social Sciences, face social scientists of the republic. Their essence is that now, as never before, it is necessary to provide a broad outlet of the social sciences to the specific needs and requirements of society, so that they would react keenly to the occurring changes, would keep new phenomena in their field of view, and would serve as a reliable reference point for living practice.

If we take a broad overview, the activity of the scientific institutions of the Social Sciences Department of the Kazakh SSR Academy of Sciences still does not satisfy the set requirements. The point is, apparently, that the department itself has not become a generator of ideas for the entire academy and has not achieved the substantial restructuring of the work of scientific research institutes. For the present the proper persistence is not visible in the turn of the themes of research toward vital problems of today, in the strengthening of the contact of the social sciences with social practice, and in the objective coverage of the history, culture, and literature of the Kazakh and other peoples of the republic.

The inadequate activity of social scientists in the elaboration of the problems of international and patriotic education and urgent questions of national and international relations is causing particular anxiety. But an integral program of this work is set forth in the decree of the CPSU Central Committee on the Kazakh Republic Party Organization! Unfortunately, this decree has not even been discussed at a meeting of the Presidium of the Academy of Sciences, measures on its implementation have also not been elaborated.

Is it worth being amazed that the Social Sciences Department has accepted for elaboration only two goal programs: "The Development of International Relations Under the Conditions of the Improvement of Socialism" and "The Improvement of National Relations and the National State System"? Moreover, their fulfillment has

been dragged out for long years. In other respects they have confined themselves to the inclusion of uncoordinated minor themes in the plan.

The sociological center, which was established under the department, in practice is inactive, the Kazakhstan Department of the Soviet Sociological Association exists formally. The activity of the Kazakh Department of the USSR Philosophical Society has decreased appreciably, while its Alma-Ata City Department has not at all shown its worth in any way. It is also possible to say the same thing about the scientific council "The Dialectics of the Development of National Relations in Kazakhstan" and the department of national and international relations, which was established at the Institute of Philosophy and Law.

What is the result? It turns out that they produced various subdivisions, but no return! Who needs all these "Potemkin villages," which are not having a practical influence on the state of international education and on the increase of the standards of international relations in the republic? For the management of the academy this question should assume fundamental importance. It is necessary to enliven the work of all the listed subdivisions and to strengthen them with personnel who are capable of ensuring the accomplishment of the tasks that have been set for them. This is all the more important in connection with the organization in the republic of an integrated system of the management of national and international relations and the international and patriotic education of the population. The commissions, departments, and working groups, which have been established in all public organizations along both horizontal and vertical lines, have an acute need for practical, serious recommendations on the broadest range of urgent questions. The duty of scientists is to provide these recommendations and to support theoretically the development of ideological and educational work.

It is also impossible not to speak about the shortcomings in the study and scientific elaboration of the questions of the linguistic culture of the peoples of Soviet Kazakhstan. At the Institute of Linguistics, for example, departments, which would engage in the study of the languages of the other peoples living in the republic, besides the Kazakh and Russian peoples, has so far not been organized. Incidentally, after the adoption of the decrees of the Central Committee of the Communist Party of Kazakhstan and the republic Council of Ministers on the improvement of the study of Kazakh and Russian, the institute, in spite of the voiced critical remarks, never became a coordinating center and did not unite the efforts of scientists in the study of questions of linguistics. Of its 93 associates only 9 are conducting circles for the study of Kazakh and Russian, the others have shirked this important matter.

One should also speak about the work of the departments of the academy. They are called upon to become the basic scientific and scientific organizational centers, which are responsible for the development of basic research in the corresponding field of knowledge. Their duty is to promote the practical implementation of scientific results and to carry out the coordination of research on the complex problems of academic, VUZ, and sectorial science. But are the departments of the academy working in such full swing?

It seems that the process of broadening the rights and increasing the responsibility of the departments is still far from its logical conclusion. And to a significant degree due to the inertia of their staffs, the managers of which are still devoting too little attention to the questions of the training, education, and placement of personnel, in practice are not having any appreciable influence on the formation of the themes of scientific research work, and are poorly contributing to the implementation of scientific results. In short, the departments exist formally, having turned into a certain intermediate instance between the Presidium of the academy and the institutes. One of the causes of such a situation probably consists in the fact that many managers of the departments simply have no time to deal with their own immediate duties. For, as a rule, they are simultaneously academician secretaries of the departments and directors of institutes, professors of higher educational institutions, editors in chief of journals, chairmen of various scientific councils and specialized councils for the defense of dissertations, as well as members of numerous commissions, elected organs, and so on and so forth. Does such an excessive number of "hypostases" do the matter good?

The structure of the staff of the Presidium of the Academy of Sciences is also imperfect. The repeated attempts of its management to solve this problem have so far not yielded the desired results.

Restructuring has aroused all the Soviet people and has attracted their attention to the problems of democratization and spiritual renewal, the preservation of the historical legacy, and the development of national cultures. Like any revolution, it requires a resolute change of thinking, the rejection of past routine approaches, and a rapid pace of the planned transformations.

The 3 years, which have passed since the memorable April (1985) CPSU Central Committee Plenum, are a meager period by historical standards, but from the point of view of restructuring and the scales of the deeds and accomplishments are an enormous period. And still it was possible to do significantly more! At one time they said that we, they say, take a long time to put on the harness, but then ride quickly. Under the conditions of revolutionary modernization one must also learn "to put on the harness" quickly. Today getting started is not simply marking time, it is a step backward from the gained positions. But one must not allow a retreat under any circumstances—we are responsible for restructuring

to future generations. It is necessary to face the truth of life directly and to realize thoroughly that a return to the past would be a tragedy for our society and for all mankind.

The Central Committee of the Communist Party and the Council of Ministers of the Kazakh SSR express confidence that scientists of Kazakhstan are thoroughly aware of the level of the responsibility, which rests on them during this unusually difficult period of life of the republic and the country. In going to meet the 19th All-Union Party Conference, every scientist and every figure of science as a true patriot and internationalist should make his own contribution to the development of a modernized society and to the strengthening of our common multinational socialist homeland.

Latvian Academy of Sciences Awards Prizes

18140044 Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian
No 4, Apr 88 pp 129-131

[Article: "In the Presidium of the Latvian SSR Academy of Sciences"]

[Excerpt] The Presidium of the Latvian SSR Academy of Sciences: By Decree No 1 of 19 January 1988 awarded the Honorary Diploma of the Presidium to Candidate of Technical Sciences I.I. Kurkalov, senior scientific associate of the Physics and Power Engineering Institute, for the achieved gains in the study of linear step motors for robotic aids and for active participation in public work.

At the Meeting of 21 January 1988

—Heard the scientific report of Academician R.A. Kukayn "Lymphotropic Retroviruses and Their Role in Human Pathology." The Presidium endorsed the research, which is being conducted under the supervision of Academician R.A. Kukayn, and recognized it as some of the most important basic research of the academy.

—Heard the report of Vice President of the Latvian SSR Academy of Sciences E.A. Yakubaytis and the report of V.M. Suveyzdis, chairman of the Joint Committee of the Trade Union of the Academy, on the progress of the social development of the Latvian SSR Academy of Sciences. Resolved to regard as the most important task of the Latvian SSR Academy of Sciences during 1988-1990 the elimination of the oversights in the work on improving the social sphere and endorsed the project of the development of the social sphere of the academy for 1988-1990. Obliged the Capital Construction Department to take urgent steps for speeding up the designing and construction of housing and children's institutions of the academy. Recommended to the managers of institutions and organizations of the academy to take urgent steps on the organization of the construction with the use of their own resources of apartment houses, sports facilities, and their own vacation bases.

—Approved the Plan of Measures on the Further Improvement of Accounting at Enterprises and Organizations of the Latvian SSR Academy of Sciences.

—Awarded the Honorary Diploma of the Presidium to S.G. Bazhanov, head of the editorial board of all-union journals of the Zinatne Publishing House, for a high level of editorial work and active participation in social life and in connection with the 30th anniversary of his labor activity at the publishing house.

At the Meeting of 11 February 1988

—Heard the scientific report of Candidate of Chemical Sciences E.L. Kupche "The First Spectra of Nuclear Magnetic Resonance of Ultrahigh Resolution on Silicon Nuclei" (the Institute of Organic Synthesis). Recognized as outstanding the work which is being conducted in this direction. Noted that new procedural approaches in research also exist at other institutes of the Latvian SSR Academy of Sciences, in connection with which it is necessary to organize seminars for the sharing of experience.

—Heard the report of Academy Vice President Academician Ya.Ya. Liyelpeter on the fulfillment by institutions of the Latvian SSR Academy of Sciences of the plans of introduction during 1987 and on the work of republic interbranch scientific technical complexes. Noted that the plan of the assimilation of developments by enterprises and organizations of the academy for the most part had been fulfilled. However, through the fault of introducing organizations several items of the plan were partially fulfilled. Pointed out to institutions of the academy the intolerability of the distortion of statistical reporting and to the Physical and Technical Sciences Department and the Chemical and Biological Sciences Department the inadequate checking of the statistical data being submitted by institutions. Obliged the bureaus of these departments to intensify the work on the organization of the activity of republic interbranch scientific technical complexes under the new conditions of management and to step up the work on the establishment of temporary laboratories.

—Awarded the prizes of the Presidium of the Latvian SSR Academy of Sciences to scientists and engineering and technical personnel of the academy:

First Prize

For the monograph "Razrusheniye konstruktsiy iz kompozitnykh materialov" [The Destruction of Components Made of Composite Materials] (the Institute of Polymer Mechanics) to V.P. Tamuzh, P.P. Oldyrev, I.V. Grushetskiy, and M.Ya. Mikelson.

For the monograph "Problemy manevrennosti v razvitii energetiki" [Problems of Maneuverability in the Development of Power Engineering] (the Physics and Power Engineering Institute) to Yu.Ya. Mazur.

For the series of works "The Multiphoton Ionization of the Hydrogen Atom" (the Institute of Physics) to E.M. Gaylite (Karula).

For the series of works "The Development of a Problem-Oriented Information Bank of Data on the Mechanics of Polymer Composites" (the Institute of Polymer Mechanics) to A.K. Malmeyster, P.E. Pikshe, and Ya.Ya. Indulevich.

For the monograph "Sistemy fermentatsii" [Fermentation Systems] (the Institute of Microbiology imeni A. Kirkhenshteyn) to U.E. Viyestur and V.V. Savenkov, as well as to A.M. Kuznetsov (the All-Union Scientific Research and Design Institute of Chemical Machine Building of Irkutsk).

For the series of works "The Breakdown of Polysaccharides When Obtaining Furfural in the Presence of Concentrated Sulfuric Acid" (the Institute of Wood Chemistry) to N.A. Vedernikov, I.M. Roze, and I.K. Krume.

For the monograph "Neorganicheskiye soyedineniya fosfora s azotom" [Inorganic Compounds of Phosphorus With Nitrogen] (the Institute of Inorganic Chemistry) to T.N. Miller and A.A. Vitole.

For the series of works "The Role of Vitamin A in the Exchange of Zinc" (the Institute of Biology) to N.I. Berzin and V.K. Bauman.

For the monograph "Razvitiye latyshskoy pismennosti" [The Development of the Written Latvian Language] (the Institute of Language and Literature imeni A. Upit) to A.Ya. Blinkena and A.Ya. Bergmane.

For the monograph "Latyshskiye krasnogvardeytsy v borbe za sovetskuyu vlast v 1917-1918 gg." [The Latvian Red Guards in the Struggle for Soviet Power in 1917-1918] (the Institute of History) to A.I. Spreslis.

Second Prize

For the series of works "The Development of Methods and Means for the Automatic Quantitative Analysis of Images of Microobjects" (the Institute of Electronics and Computer Technology) to G.G. Gromov, Yu.O. Popov, and B.A. Yanson.

For the work "The Development, Making, and Introduction of a Set of Instruments of the Nondestructive Testing of Complex Systems in Accordance With License Contracts in Bulgaria and Hungary and at Enterprises of the Country With the Assimilation of Series Production" (the Physics and Power Engineering Institute) to Yu.K. Grigulis, V.V. Gavrilin, and Ya.E. Silinsh.

For the work "The ZINAP MIKRO Modular System" (the Institute of Polymer Mechanics) to Ya.A. Kalninsh, I.P. Upitis, and Ya.A. Eglon.

For the series of works "The Regularities of Forming in Case of the Interspecific Hybridization of Black Currants and the Development of New Source Material for Selection" (the Botanical Garden) to A.A. Melekhina, M.A. Eglite, and B.B. Yankelevich.

For the work "The Formation and Structure of Lignins From the Point of View of the Scaling Approach" (the Institute of Wood Chemistry) to Ya.A. Gravitis, V.G. Ozol-Kalnin, and A.G. Kokorevich.

For the work "The Scientific Principles of the Synthesis of Hetarylaldehydes by the Catalytic Oxidation of Nitrogen-Containing Methyl Heterocycles" (the Institute of Organic Synthesis) to L.Ya. Leytis and M.V. Shimanskaya.

For the series of works "The Nuclear Magnetic Resonance Study of the Spatial Structures of Natural Peptide Hormones and Their Cyclic Analogs in Solution" (the Institute of Organic Synthesis) to Yu.B. Saulitis, E.E. Liyepinsh, and F.K. Mutulis.

For the monograph "Latviya vo vremya pervoy mirovoy voyny" [Latvia During World War I] (the Institute of History) to V.M. Berzinsh.

For the monograph "Mogilnik kamennogo veka 'Zveyniyeki'" [The Zveyniyeki Stone Age Burial Ground] (the Institute of History) to V.F. Zagorskis (posthumously).

Third Prize

For the series of works "High Order Perturbation Theory" (the Institute of Physics) to R.Ya. Damburg and R.Kh. Propin.

For the series of works "The Theoretical Bases and the Implementation of Open Local Area Mininetworks of Distributed Measurement and Control" (the Institute of Electronics and Computer Technology) to S.B. Bondar and V.Yu. Vedin.

For the series of works "The Development and Introduction of Permanent Cylindrical Domain Memory Systems of Increased Reliability and Means for Their Testing" (the Institute of Electronics and Computer Technology) to I.M. Blyumenau, V.C. Ivanov-Lashkanov, and B.I. Lubgin.

For the work "An Automated Workstation of Structural Diffusion Research" (the Institute of Wood Chemistry) to K.V. Zeyiya, A.E. Kreytus, and U.P. Zviyedris.

For the series of works "The Effect of Various Factors on Lead Metabolism in the Body of Animals" (the Institute of Biology) to R.Ye. Andrushayte.

For the work "A New Subtype of Human Leukocyte Interferon: The Cloning and Structure of the Gene" (the Institute of Organic Synthesis) to V.M. Berzin and A.Yu. Tsimanis.

For the series of works "Infrared Spectrophotometric Methods of Monitoring Biotechnological Processes" (the Institute of Microbiology imeni Avgust Kirkhenshteyn) to Yu.O. Yakobson and Ye.D. Zagrebe.

For the work "The Synthesis and Properties of Azoles" (the Institute of Organic Synthesis) to A.V. Yeremeyev, V.G. Andrianov, and I.B. Starchenkov.

For the monograph "Sovremennaya religioznost: osobennosti, dinamika, krizisnyye yavleniya" [Modern Religiosity: The Peculiarities, Dynamics, and Crisis Phenomena] (the Institute of Philosophy and Law) to A.A. Podmazov.

For the monograph "Sovershenstvovaniye planirovaniya i stimulirovaniye proizvodstva na promyshlennykh predpriyatiyakh" [The Improvement of Planning and the Stimulation of Production at Industrial Enterprises] (the Institute of Economics) to K.Ya. Svilpe, I.Kh. Kirtovskiy, and S.A. Rusakova.

Awarded the 1987 prizes of the Latvian SSR Academy of Sciences to young members of the academy for the following scientific research works and the development of instruments for scientific research:

For the series of works "The Forecasting of the Deformation Properties of Polymer Composites With a Hybrid Dispersed Filler" (the Institute of Polymer Mechanics) to junior scientific associate Yu.A. Dzenis.

For the series of works "A Small Video System for Scientific Research" (the Institute of Electronics and Computer Technology) to scientific associates S.N. Razzhivin and V.G. Reyskart.

For the series of works "The Dynamics of the Motion of Valley Boundaries in Magnetic Semiconductors With Defects: The Theory and Computer Simulation" (the Institute of Physics) to junior scientific associate A.V. Muromtsev.

For the series of works "N-Glucoronides of Pyrimidines and Purines" (the Institute of Organic Synthesis) to Candidate of Chemical Sciences Yu.A. Maurinsh.

For the series of works "The Electrode and Transport Properties of Liquid Membranes Based on Various Extractants" (the Institute of Inorganic Chemistry) to scientific associate A.D. Gutsol.

For the series of works "The Obtaining and the Properties of Reactive Nitric Acid Pulp From Wood for Nitration" (the Institute of Wood Chemistry) to junior scientific associate V.L. Egle.

For the series of works "The Adaptation of the Systems of the Hydrolysis and Transport of Carbohydrates in the Intestines of Chicks" (the Institute of Biology) to Candidate of Biological Sciences T.A. Sheshukova.

For the series of works "The Sanitation of Chrysanthemums From Viral Diseases" (the Botanical Garden) to junior scientific associate A.Kh. Shilinsh.

For the series of studies "The Peculiarities of the Retardant Effect of 2-Ethyl Chloride Phosphonic Acid on the Growth Processes of Plants" (the Institute of Biology) to scientific associates N.V. Kurushina and V.V. Moseyev and junior scientific associate V.V. Ilin.

For the series of works "Dialects of the Latvian Language: Synchrony and Diachrony" (the Institute of Language and Literature imeni A. Upit) to junior scientific associate A.A. Sarkanis.

For the series of works "Topical Questions of Latvian Folklore and Folklore Studies" (the Institute of Language and Literature imeni A. Upit) to graduate student G.E. Pakalns.

The Presidium awarded the 1987 prizes of the Latvian SSR Academy of Sciences to students of higher educational institutions of the republic:

In the Physical Mathematical Sciences

For the work "The Influence of Filtering on the Noise Immunity of the Reception of Frequency-Modulated Signals With a Continuous Phase" to O.G. Denisov, a 4th year student of the Faculty of Radio Engineering and Communications of Riga Polytechnical Institute imeni A.Ya. Pelshe.

For the work "The Numerical Simulation of Physical Processes in an Ore Smelting Furnace" to U.A. Betkhers, a 4th year student of the Physics and Mathematics Faculty of the Latvian State University imeni P. Stuchka.

In the Technical Sciences

For the work "The Determination of the Amounts of Reserve Fuel for the Regulation of the Nonuniformity of Gas Consumption of the Latvian SSR for the Period to 2000" to T.A. Kravale and I.Ye. Skripkina, 4th year students of the Engineering and Construction Faculty of Riga Polytechnical Institute imeni A.Ya. Pelshe.

For the work "A Photon Counter With Microprocessor Control" to A.Ya. Groza, a graduate of the Physics and Mathematics Faculty of the Latvian State University imeni P. Stuchka.

In the Chemical Sciences

For the work "Syntheses Based on 2-Butene-4-Olides" to M.A. Ziyemele, a 5th year student of the Chemical Technology Faculty of Riga Polytechnical Institute imeni A.Ya. Pelshe.

For the work "A Universal Mathematical Model of Isotachophoretics Processes" to V.A. Gimelfarb, a 4th year student of the Chemistry Faculty of the Latvian State University imeni P. Stuchka.

In the Biological Sciences

For the work "A Comprehensive Geoecological Description of Several Sites of Protected Plants and the Problems of Their Preservation" to V.L. Strautniyetse, a graduate of the Geography Faculty of the Latvian State University imeni P. Stuchka.

For the work "The Standardization of Laboratory Animals (Mice) With Respect to the Factor of Nutrition" to N.Ya. Zhuk, a 4th year student of the Biology Faculty of the Latvian State University imeni P. Stuchka.

For the work "The Change of the Energy Parameters of the Bacteria Zymomonas mobilis Under Nonspecific Conditions of the Environment" to A.Z. Slave, a 4th year student of the Biology Faculty of the Latvian State University imeni P. Stuchka.

For the work "The Zootechnic Evaluation of Aminophenylacetic Acid in the Diet of Personal Chickens" to S.I. Osadcha, a 6th year student of the Zooengineering Faculty of the Latvian Agricultural Academy.

Candidates For Lenin, State Prizes Named

18140309 Moscow IZVESTIYA in Russian
9 Jun 88 p 3

[Article: "From the Presidiums of the Committee on USSR Lenin and State Prizes in the Area of Science and Technology under the USSR Council of Ministers and the All-Union Central Council of Trade Unions"]

[Text] The Presidiums of the Committee on USSR Lenin and State Prizes in the Area of Science and Technology, under the USSR Council of Ministers and the All-Union Central Council of Trade Unions, report that the following candidates, leading workers in the all-union socialist competition, have been allowed to compete for the 1988 USSR State Prize for outstanding achievements in labor:

1. A.T. Alekseyev, A.V. Vshivtsov, N.A. Karbanov, V.P. Kashkin, V.A. Kolesnikov, V.Ye. Paramzin, S.A. Petrukhin, V.A. Pilipchuk, Yu.I. Sadyrin, V.P. Tsapish, V.I. Shevchenko and V.P. Yakimets—for outstanding achievements in labor and in scientific and technical creativity, and great personal contribution in increasing coal output, accelerating the growth of labor productivity and economizing on resources.

Recommended by the central committee of the trade union for workers in the coal industry and by the USSR Ministry of the Coal Industry.

2. N.M. Shakirzyanov, R.Kh. Kuzakhmedov, P.G. Chernov, S.G. Pomoraybin, B.I. Griniv, P.A. Lebedev, R.F. Gimatudinov, Ye.Ye. Shklyarskiy, A.F. Lazarev, V.P. Zavyalova, I.V. Kindratenko and V.P. Pisenko—for outstanding achievements in labor and scientific and technical creativity and for great personal contribution in increasing oil and gas output.

Recommended by the central committee of the trade union for workers in the petroleum and gas industry, the USSR Ministry of the Gas Industry, the USSR Ministry of the Petroleum Industry, and the USSR Ministry for Construction of Petroleum and Gas Industry Enterprises.

3. B.A. Agafonov, V.I. Babenko, P.Ye. Gil, N.N. Dobrokhodskiy, F.A. Petrov, A.I. Polikarpov, A.D. Yagmur, F.Ya. Akilov, I.P. Baran, O.A. Israyelyan, V.P. Kargapolov and Yu.N. Krasovskiy—for outstanding achievements in labor, active participation in technical creativity and great personal contribution in increasing productivity and raising the quality of metal products.

Recommended by the central committee of the trade union for workers in the metallurgical industry, the USSR Ministry of Nonferrous Metallurgy and the USSR Ministry of Ferrous Metallurgy.

4. N.A. Deryabin, V.N. Filin, A.I. Menovshchikov, V.G. Kurdyukov, N.P. Tishchenko, P.Ya. Belikova, V.I. Kolesnikovich, N.L. Lukin, V.A. Zadorozhniy, A.Yu. Chyaponene, L.Ye. Prono and Kh.F. Galiyev—for outstanding achievements in labor and great personal contribution to improving the utilization of forest resources.

Recommended by the central committee of the trade union for workers in the forest, paper and wood-processing industry, the USSR Ministry of the Forest Industry and the USSR State Forestry Committee.

5. A.I. Dubrovin, K.P. Lebedev, B.G. Makeyev, G.G. Palshin, G.P. Pivovarov, N.V. Tishchenko, N.P. Golubev, V.T. Pustovit, Yu.I. Filimonov, A.I. Guba, V.A. Kesler and A.N. Sosin—for outstanding achievements in labor and great personal contribution to raising the technical level of the machines and mechanisms being produced.

Recommended by the central committees of the trade unions for workers in the shipbuilding industry and for workers in heavy machine building, the USSR Ministry of the Shipbuilding Industry and the USSR Ministry of Heavy, Power and Transport Machine Building.

6. A.P. Virbitskas, V.N. Goganov, V.V. Yermolayev, A.A. Yeroshkin, Ye.K. Zubovich, A.F. Podstrizhen, V.M. Vysotskiy, V.I. Kozhin, Ye.F. Krashnev, G.A. Kharkhan, V.I. Tsyrulnikov and N.P. Yatsenko—for outstanding achievements in labor and great personal contribution to raising the technical level of the automobiles, tractors and agricultural equipment being produced.

Recommended by the central committee of the trade union for workers in the automotive, tractor and agricultural machine building, the USSR Ministry of the Automotive Industry and the USSR Ministry of Agricultural and Tractor Machine Building.

7. M.G. Pulina, L.P. Mikhalets, V.L. Bekrikh, N.I. Lyashenko, V.A. Kononov, A.D. Likhosherstov, I.V. Loza, A.V. Kuznetsov, N.S. Kopylova, P.Ya. Dirvans and B.I. Avayev—for outstanding achievements in labor and great personal contribution to raising the technical level of the machine tools and equipment being produced.

Recommended by the central committees of the trade unions for workers in machine and instrument building and for workers in heavy machine building, the USSR Ministry of Instrument Making, Automation Equipment and Control Systems, the USSR Ministry of the Machine Tool and Tool Building Industry, and the USSR Ministry of Construction, Road and Municipal Machine Building.

8. A.A. Druzhinin, Ye.V. Milovatskiy, V.Ye. Shevchuk, S.I. Verbitskaya, I.N. Kaunova, A.Ye. Kolbeshin, A.L. Bliznikas, S.V. Lupandin, V.I. Pugachev, V.F. Luchinskiy and A.V. Puzhlivyy—for outstanding achievements in labor and great personal contribution in raising the technical level of communications equipment and instruments.

Recommended by the central committees of the trade unions for workers in the radio electronics industry, for communications employees, and for workers in electric power plants and the electrical equipment industry, and by the USSR Ministry of Atomic Energy, the USSR Ministry of the Communication Equipment Industry, the USSR Ministry of the Radio Industry, the USSR Ministry of the Electronics Industry and the USSR Ministry of Communications.

9. A.F. Beremeyev, Yu.S. Zhavoronkov, M.I. Utkina, A.S. Yermolayev, N.P. Antonova, O.A. Gagarina, G.N. Konovalov, A.P. Pekhov, R.P. Chukareva, Ye.N. Pyankov, V.G. Sirotin and A.I. Dolmatov—for outstanding achievements in labor and great personal contribution in improving the quality of machine-building production.

Recommended by the central committee of the trade union for workers in machine and instrument building and by the USSR Ministry of Instrument Making, Automation Equipment and Control Systems.

10. N.M. Bulava, K.I. Nyuksha, S.A. Sulakadze, A.V. Yakovlev, V.G. Apatrov, I.V. Rogov, Y.A. Kleyza, Yu.N. Podsevalov, A.G. Romashov and B.V. Rybak—for outstanding achievements in labor and great personal contribution in improving equipment and production technology.

Recommended by the central committees of the trade unions for workers in heavy machine building and for workers in electric power plants and the electrical equipment industry, the USSR Ministry of Chemical and Petroleum Machine Building, the USSR Ministry of the Electrical Equipment Industry and the USSR Ministry of Power and Electrification.

11. N.L. Adamchuk, Yu.I. Deymund, I.S. Dubovik, N.G. Yeliseyev, P.M. Zharinov, I.B. Idiatulin, T.I. Kamyshova, V.D. Marsakova, O.G. Novik, N.I. Oparin, M.N. Poddubskiy and Ye.I. Serova—for outstanding achievements in labor and great personal contribution to the development of the collective contract and intra-industry cost-accounting in construction.

Recommended by the central committee of the trade union for workers in construction and the construction materials industry, the USSR State Construction Committee, Glavmospromstroy, Glavmosoblstroy and Glavmosoblstroymaterialov.

12. A.M. Alirzayev, T.A. Bekyan, V.S. Bochkarev, V.P. Gimelshpak, P.B. Zhalimas, V.I. Kryvulya, I.A. Molodtsov, A.A. Mordvinov, V.G. Orlova, V.I. Roslyakov, A.K. Frolov and A.A. Khanevich—for outstanding achievements in labor and great personal contribution to solving the housing problem on the basis of augmenting the production capacities for house-building and for wall materials.

Recommended by the central committee of the trade union for workers in construction and the construction materials industry, the USSR State Construction Committee, Glavmosstroy and Glavleningradstroy.

13. I.D. Zakharchuk, V.F. Maas, Z.I. Tomskaya, P.Ye. Verkholantsev, A.I. Prusova, A.N. Malyarchuk, V.S. Bakanovskiy, I.R. Boyev, L.M. Lysok, P.P. Makeyev and B.S. Shkipur—for outstanding achievements in labor and great personal contribution in finding and utilizing reserves for economizing on raw materials, materials and fuel and energy resources.

Recommended by the central committees of the trade unions for geological prospecting workers, for workers in railroad transport and transport construction and for workers in the agroindustrial complex, and by the USSR Ministry of Geology, the USSR Ministry of Transport Construction, and the USSR Ministry of Land Reclamation and Water Resources.

14. G.M. Guryanova, N.Kh. Yerdenova, N.I. Ignatenko, R.V. Lobovkin, V.A. Matveyev, Z.G. Shkaruba, G.K. Belyashov, A.A. Gerusov, V.V. Livitskiy, V.F. Patiyenov and A.M. Terekhov—for outstanding achievements in labor and in scientific and technical creativity, and great personal contribution in raising the operation efficiency of automotive and railroad transport.

Recommended by the central committees of the trade unions for automotive transport and highway workers, for workers in railroad transport and transport construction, the USSR Ministry of Railways, the USSR Ministry of Transport Construction, the RSFSR Ministry of Automotive Roads, the RSFSR Ministry of Automotive Transport, the UkSSR Ministry of Automotive Transport, and Glavmosgortrans.

15. Yu.N. Bakurov, A.M. Deshevykh, N.M. Khomenko, P.V. Khamitov, A.I. Kalyagin, N.A. Strogiy, A.M. Zdanavichyus, S.I. Antonov, N.S. Arkhipov, A.M. Chub and L.N. Kondratyeva—for outstanding achievements in labor scientific and technical creativity, and great personal contribution in increasing the operation efficiency of air and water transport and of fishing vessels.

Recommended by the central committees of the trade unions for aviation workers, for workers in the maritime and river fleet and for fishing industry workers, and by the USSR Ministry of Civil Aviation, the USSR Ministry of the Maritime Fleet, the USSR Ministry of the Fish Industry, the USSR State Committee on Hydrometeorology, the RSFSR Ministry of the River Fleet, and the River Fleet Main Administration under the UkSSR Council of Ministers.

16. A.S. Bokarev, A.A. Starovoytov, A.M. Zagrin, M.K. Kananykhin, S.N. Manerkina, I.M. Nekhorosh, V.I. Ivanov, V.K. Kovryga, F.M. Lopatin, S.R. Syaskkin, V.I. Tikhonov and A.V. Shishebarov—for outstanding achievements in labor and the high efficiency and quality of work to repair hardware and equipment.

Recommended by the central committee of the trade union for workers in the maritime and river fleet and by the USSR Ministry of the Maritime Fleet.

17. N.V. Vorobyeva, N.D. Dogadov, V.Ye. Kulkova, T.M. Yaichkova, Z.I. Mitina, G.S. Pugovkin, T.P. Sazhinova, Ye.M. Parchevskaya, T.S. Gulidova, K. Akhmedova, Kh.V. Zarinya and E.A. Alumere—for outstanding achievements in labor and great personal contribution to increasing the output and radically improving the quality of consumer goods.

Recommended by the central committee of the trade union for workers in the textile and light industry and by the USSR Ministry of Light Industry.

18. Ye.K. Ivanova, P.K. Kayrene, A.A. Kiselev, Z.V. Kurilova, V.P. Chekalkina, G.I. Dankovskaya, V.V. Makoviy, B. Shermatov, F.I. Abdullin, E.M. Osmonov and T.N. Murzina—for outstanding achievements in labor and great personal contribution to expanding services and raising the quality of services for the public.

Recommended by the central committees of the trade unions for workers in state trade and in consumer cooperatives, for workers in state establishments, for workers in local industry and municipal and domestic service enterprises, and for workers in the chemical and petrochemical industry, and by the USSR Ministry of the Chemical Industry, the USSR Central Council of Consumer Societies, the Central Council of the All-Union "Dinamo" Physical Culture and Sports Society, the RSFSR Ministry of Domestic Services for the Public, the UkSSR Ministry of Housing and Municipal Economy, the UzSSR Ministry of Housing and Municipal Economy, the KaSSR Ministry of Local Industry, the LiSSR Ministry of Local Industry, and the KiSSR Ministry of Domestic Services for the Public.

19. V.M. Svirko, A.A. Chernikova, Ye.P. Kochu, A.N. Grishko, A.S. Demina, Yu.G. Korolev, Ye.N. Potapova, M.L. Fedetsova, Ya.K. Babichene, N.S. Samorodova and V.V. Belagina—for outstanding achievements in labor and great personal contribution in the development and introduction of advanced methods for the organization of labor and production.

Recommended by the central committees of the trade unions for workers in the agroindustrial complex, for workers in state trade and in consumer cooperatives, workers at state establishments, workers in culture, medical workers, workers in education, higher schools and scientific institutions, and for workers in the chemical and petrochemical industry, and by the USSR Ministry of Health, the USSR Ministry of Defense, the USSR Ministry of Trade, the USSR Ministry of Grain Products, the USSR State Committee on National Education, and the CPSU Central Committee Administration of Affairs.

20. A.A. Palchenok, Ye.V. Krot, A.K. Grachev, I.I. Danchevskiy, A.R. Tabachkov, M.N. Grishin, A.I. Kurtsova, A.A. Trigub, A.S. Kornev, F.K. Buchma and S.L. Kazaryan—for outstanding achievements in labor and great personal contribution in finding and utilizing internal production reserves.

Recommended by the central committees of trade unions for workers in the agroindustrial complex, for workers in heavy machine building and for workers in the chemical and petrochemical industry, and by the USSR Ministry of the Petroleum Refining and Petrochemical Industry, the USSR Ministry of Mineral Fertilizer Production, the USSR Ministry of Heavy, Power and Transport Machine Building, and the USSR State Agroindustrial Committee.

21. N.A. Pechenin, V.K. Androsov, M.G. Minnegulov, I.I. Volkov, V.S. Kulyabin, I.K. Pyatkovskiy, A.G. Fomin, P.V. Korinetskiy, S.F. Kagarlykskiy, G.V. Chernykh, I.G. Mironyuk and T.A. Abilpeisov—for outstanding achievements in labor, for obtaining high and consistent harvests of grain and fodder crops, and for introducing intensive technologies for cultivating these crops.

Recommended by the central committee of the trade union for workers in the agroindustrial complex and by the USSR State Agroindustrial Committee.

22. N.G. Arzamaskin, V.I. Kozhukhov, L.I. Kozhukhov, N.P. Pulatov, M.I. Novitska, Z.M. Zabuga, A.A. Shumskiy, T. Kudratov, T. Khodzhamuratov, V.T. Sokolov, S.I. Salmanov and Sh.I. Nurullayeva—for outstanding achievements in labor and great personal contribution in increasing production and in the processing of plant-growing products on the basis of broad use of progressive forms of labor organization.

Recommended by the central committee of the trade union for workers in the agroindustrial complex and by the USSR State Agroindustrial Committee.

23. D.B. Sunduyev, T.V. Korneyeva, M.P. Filippov, N.G. Nagornaya, V.M. Ionova, O.A. Mulyarchuk, V.N. Lazorskaya, V.M. Chernogalova, Zh. Kusainov, N.V. Tsiklauri, D.K. Rimkuvene and T. Klychdurdyyev—for outstanding achievements in labor and great personal contribution in increasing production and raising the quality of animal husbandry products.

Recommended by the central committee of the trade union for workers in the agroindustrial complex and by the USSR State Agroindustrial Committee.

24. N.V. Dimitriyeva, A.V. Fedotova, A.D. Larchenkova, T.P. Medvedeva, N.L. Kuvyrkina, L.K. Romanova, V.S. Shevchuk, V.Ya. Samosyuk, L.V. Yarotskaya, F.Ye. Popa, M.A. Mugarevich and N.M. Tilk—for outstanding achievements in labor and great personal contribution in raising the productivity of cows and reducing the cost of milk on the basis of effective use of science and leading practice.

Recommended by the central committee of the trade union for workers in the agroindustrial complex and by the USSR State Agroindustrial Committee.

25. L.P. Artemyeva, N.K. Chuyko, L.N. Kraynova, P.M. Menshchikova, N.P. Samoylin, R.V. Zhitnikova, N.P. Prokopchuk, Ye.S. Derevoriz, Kh. Khatamov, A.A. Marchenko, Ch.P. Pravdzinskas and I.D. Melekhov—for outstanding achievements in labor and great personal contribution in raising the efficiency of agroindustrial production and the quality of work.

Recommended by the central committee of the trade union for workers in the agroindustrial complex and by the USSR State Agroindustrial Committee.

All references and materials for public discussion and observation should be sent to the Committee before 15 August of this year, at the address: 125047, Moscow, 3 Tverskaya-Yamskaya St., Building 46; telephone numbers: 250-38-08; 250-19-47; 2250-37-14.

Candidates for Lenin Komsomol Prize for 1988 Listed

18140325 Moscow KOMSOMOLSKAYA PRAVDA in Russian 12 Jul 88 p 4

[List of works submitted to the Komsomol Central Committee Commission for the second round of competition for the 1988 Lenin Komsomol Prize in the area of science and technology: "From the Komsomol Central Committee Commission on Lenin Komsomol Prizes in the Area of Science and Technology"]

[Text] The Komsomol Central Committee Commission on Lenin Komsomol Prizes in the area of science and technology has examined 110 works done by young scientific workers, VUZ teachers, engineers, graduate students and workers, presented for the competition for the 1988 Lenin Komsomol prizes. On recommendations by expert groups, the Commission has allowed 47 works to enter the second round of competition for the Lenin Komsomol prizes in the area of science and technology.

In publishing this list of works, the Commission requests that the leaders of scientific and scientific-technical societies, scientific institutions, enterprises and higher educational institutions, as well as the leaders of party, Komsomol and other social organizations, send their opinions and observations, as well as materials for social discussion, to the Commission before 15 September 1988, to the address: 103982, Moscow, Downtown, B. Khmelnitskiy St., Building 3/13, Komsomol Central Committee Commission on Lenin Komsomol Prizes in the Area of Science and Technology. Telephone: 206-85-84, 206-89-08.

S.M. Avanesyan, I.M. Baranova, S.V. Govorkov, V.B. Leonov, Ye.D. Mishina, A.A. Nikulin, G.A. Paytyan, A.V. Petukhov, S.A. Ratseyev and V.I. Tsytsanu—"New Methods for Non-Linear Optical Diagnostics of a Surface, Lines of Separation and Surface Structures of Semiconductors and Metals." Recommended by the Komsomol Committee and the Council of Young Scientists at Moscow State University imeni M.V. Lomonosov.

A.I. Alekseyev, M.L. Andreyeva, N.V. Gorbachev, G.A. Guseynov, S.Kh. Zhabbarov, S.P. Maslennikov, M.P. Romanov, A.V. Treshchev, A.Ye. Filimonov and A.G. Shukhov—"Transportation System for Flexible Automated Production on the Basis of the 'Elektronika NTs TM' Family of Mobile Robots." Recommended by the Zelenogradskiy Komsomol Raykom, Moscow, and the Moscow Institute for Radio Equipment, Electronics and Automation.

P.P. Almurzin, M.V. Nikitin, V.P. Safonov and S.F. Tsarkov—"Development and Creation of a Series of Aircraft for Initial Instruction and the National Economy." Recommended by the Kuybyshev Aviation Plant.

Sh.A. Alpeisov, Yu.A. Belozerov, A.V. Sergiyenko, O.A. Starchenkov, V.G. Tsoy, O.A. Tsoy and A.A. Chagelishvili—"Development and Introduction of Technology for Intensive Production of Goose Farming Products With a Significant Reduction in Labor and Resource Outlays." Recommended by the All-Union Scientific Research and Technological Institute for Poultry Farming.

Sh.A. Amonashvili—A cycle of works on the problems of upbringing children of a preschool and elementary school age. Recommended by the Georgian Komsomol Central Committee.

A.V. Andreyev, L.F. Makarova, M.V. Makarova, I.A. Rostovtseva, Yu.F. Kislitskiy, G.G. Poznyak, S.V. Shapovalenko, V.V. Pogosyan, O.S. Durasova and V.P. Zolotov—"System for Automated LSI Circuit Design on a YeS Computer and its Application in Manufacturing Plants." Recommended by the Scientific Research Center for Electronic Computer Equipment.

V.P. Antropov, M.I. Katsnelson, A.I. Likhtenshteyn, I.I. Mazin, A.V. Postnikov and S.N. Rashkeyev—"Quantitative Theory of the Magnetic, Electrical and Optical Properties of Transition Metals, Their Alloys and Compounds." Recommended by the presidium of the USSR Academy of Sciences Urals Department and the Sverdlovsk Komsomol Obkom.

A.P. Arzin, I.I. Vintizenko, S.Yu. Galuzo, V.A. Kubarev, O.T. Loza, V.V. Mikheyev, A.G. Nikonov, Ye.V. Ilyakov, Yu.M. Savelyev and A.V. Fedotov—"Formation and Transport of Highly Accurate Electron Beams for Powerful Relativistic Microwave Electronics Systems." Recommended by the Komsomol Committee and the Council of Young Scientists at Moscow State University imeni M.V. Lomonosov.

A.A. Afanasyev, Ye.A. Afanasyeva, D.V. Voronin, V.A. Kulikovskiy, G.A. Lyamin, A.I. Sychev, P.A. Fomin and S.M. Frolov—"Non-Ideal Detonation of GAZ-Type Systems—Condensed Phase." Recommended by the USSR Academy of Sciences Siberian Department Institute of Hydrodynamics imeni M.A. Lavrentyev.

M.V. Baluda, M.V. Kamkamidze, L.V. Lyubina and I.K. Tlepshukov—"Diagnostics of Violations of the Antithrombogen Properties of Vascular Walls in Pathology and Methods for Restoring Them." Recommended by the USSR Academy of Medical Sciences Scientific Research Institute for Medical Radiology, the Moscow Medical Stomatological Institute imeni N.A. Semashko and the republic Orthopedic Surgical Hospital for Restorative Treatment of the Georgian SSR MZ.

S.A. Baranov, A.V. Gornakov, Ye.L. Karpukhin and M.M. Svinin—"Development and Application of Software for the Study and Design of Robotic Equipment and Vibration Protection Systems." Recommended by the Irkutsk Komsomol Obkom.

N.N. Batuyeva, V.G. Dolgikh, M.L. Kukushkin, Ye.Ye. Meyzerov and A.V. Chistyakov—A cycle of research on the comprehensive study of pain mechanisms and reflex methods of anesthetization. Recommended by the USSR Minzdrav TsNII for Reflex Therapy.

A.A. Belogradskiy, A.S. Dorkin, V.N. Zabavin, Yu.A. Kireyev, V.V. Novopashin, V.A. Panchenko, N.A. Petrova, V.I. Plastov, L.G. Shilin and S.N. Yakovlev—"Development and Introduction in Series Production of a Standardized Line of Yttrium-Aluminium Garnet Pulsed Lasers and Emitters, Designed on a Unified Modular Basis, For Technological Applications in Industry and Scientific Research." Recommended by an enterprise from the USSR Ministry of the Electronics Industry.

A.A. Bogdanov, A.F. Dukhovich, A.V. Kabanov, A.L. Klibanov, N.L. Klyachko, I.N. Kurochkin, Ye.L. Maltseva, N.V. Porodenko, M.G. Sergeyeva and Yu.L. Khmelnitskiy—"Physical and Chemical Study of the Regulation of Membrane Biocatalysts and Receptors." Recommended by the USSR Minzdrav Institute of Applied Molecular Biology.

A.Ya. Borshchevskiy, Ye.B. Rudnyy, N.S. Chilingarov and S.V. Krasulin—"Creation of Equipment and Development of Methods for Studying Compounds with High Electron Affinity." Recommended by the Komsomol Committee and Council of Young Scientists of Moscow State University imeni M.V. Lomonosov and by the Atomic Energy Institute imeni I.V. Kurchatov.

I.V. Buryakov, V.Ye. Galinnikov, I.M. Galtseva, V.N. Kovalev, V.A. Kreydich, N.G. Nadeyeva, M.D. Sarycheva, Ye.V. Safroshina, N.V. Sorokina and A.V. Shimanskiy—"Comprehensive Development of Materials and Technological Processes for the Production of Protective Screens, Ensuring Flight Safety of Civil Aviation Aircraft under Emergency Conditions." Recommended by the All-Union Scientific Research Institute for Aviation Materials.

V.N. Byzova, Ye.E. Zhukova and Ye.I. Zakharova—"Creation of Industrial Methods for the Synthesis of Vitamin K1 and the Disodium Salt of Phosphate dl-alpha-tocopherol for the Needs of Medicine and Microbiology." Recommended by the Moscow Institute of Fine Chemical Technology imeni M.V. Lomonosov.

I.V. Vinyar, S.M. Yegorov, Yu.Yu. Karzhavin, I.V. Miroshnikov, V.Yu. Sergeyev, A.P. Umov and S.N. Ushakov—"Development of New Diagnostics for Tokamak Plasma by the Macroparticle Injection Method." Recommended by the Leningrad Polytechnical Institute imeni M.I. Kalinin and the Atomic Energy Institute imeni I.V. Kurchatov.

S.B. Gavshin, G.A. Potapov and Yu.M. Kharlamov—"Quasi-spherical Detector of Cherenkov Radiation in Water." Recommended by MIFI and the USSR Academy of Sciences Far Eastern Department Pacific Ocean Oceanological Institute.

S.A. Galkin, V.V. Drozdov, A.A. Martynov, S.Yu. Medvedev, Yu.Yu. Poshekhonov, S.G. Bespoludennov and V.D. Pustovitov—A cycle of works, "Mathematical Modeling of MHD Equilibrium and Stability of Plasma in Systems with Magnetic Containment." Recommended by the USSR Academy of Sciences Institute of Applied Mathematics imeni M.V. Keldysh.

S.R. Gildenskiold, L.A. Komyazhenkova and O.R. Mikhaylov—"Hygienic Questions of Creating Closed Water Resource Systems for Industrial Enterprises and Complexes." Recommended by the Moscow Medical Institute No 1 imeni I.M. Sechenov.

S.K. Golikov, L.N. Grishkov, L.B. Gutkovskiy, V.V. Kulachenkov, V.V. Lukin, M.V. Mazun, A.B. Olshanskiy, A.G. Slemzin, V.I. Tarakhtunov and A.P. Timofeyev—"Development of New Powdered Materials and Progressive Technologies for Obtaining Objects and Coatings." Recommended by the "Tulachermet" Scientific Production Association and the Tula Komsomol Obkom.

D.B. Dzhusupova and A.B. Manashayeva—"Intensification of the Microbiological Cleansing of Sewage from Toxic Compounds." Recommended by the KaSSR Academy of Sciences Institute of Microbiology and Virology.

Yu.Ye. Dubrova, K.M. Ikramov and A.N. Kucher—"Risk Factors of Human Prenatal Mortality (A Population-Genetic Study)." Recommended by the USSR Academy of Sciences Institute of General Genetics imeni N.I. Vavilov.

I.N. Yevtyutova, L.Ye. Grafeyeva and T.S. Chikirina—"Study of a System of Chromium (VI)-Zinc-Alkali Metal As Applied to the Purification and Regeneration of Concentrated Chromium-Containing Sewage from Galvanizing Industries." Recommended by the Chelyabinsk branch of USSR Gosstroy VNIIvodgeo.

S.Yu. Ivanov and A.V. Krylovskiy—"Improvement of a Gas Collector Joint and of the Alumina Charging of Aluminum Electrolyzers with a Top Current Lead." Recommended by the Moscow Institute of Steel and Alloys.

I.Ye. Inzhevatkin, S.A. Stanchits and N.G. Tomilin—"Physical Bases for the Breakdown of Strata and Methods for Predicting Rock Bursts." Recommended by the USSR Academy of Sciences Physical and Technical Institute imeni A.F. Ioffe.

M.Yu. Karganov and L.S. Godlevskiy—"Neuropeptides in the Occurrence and Elimination of Neuropathological Syndromes." Recommended by the USSR Academy of Medical Sciences Scientific Research Institute for General Pathology and Pathological Physiology.

B.Z. Kasymov, I.V. Kosnikova, M.M. Alimov and F.A. Klebleyev — "Experimental Substantiation for the Use of Hemosorption in the Comprehensive Treatment of Serious Ischemia of the Extremities." Recommended by the Tashkent branch of the USSR Academy of Medical Sciences VNTsKh.

M.M. Kozlov, S.I. Sukharev, S.L. Leykin, G.B. Melikyan, O.M. Parnev and Ye.Ye. Yegorov—"Structural Reconstruction of Membranes: Electrical Disruption, Lysis, Consolidation." Recommended by the USSR Academy of Sciences Institute of Electrochemistry imeni A.N. Frumkin.

I.V. Kochikov, I.V. Radin and M.Yu. Semenov—"Radioautography and the Probabilistic-Statistical Spectrometry of Charged Particles Using Hard-Body Nuclear Track Detectors: Identification and Quantitative Analysis." Recommended by the Odessa State University imeni I.I. Mechnikov.

I.V. Kukushkin—"Divided Hall Quantum Effect in Silicon Metal-Dielectric-Semiconductor Structures." Recommended by the USSR Academy of Sciences Institute of Hard Body Physics.

Yu.A. Lebedev—"Development of Force Elements and Study of Their Effect on Rock Masses." Recommended by the Gorno-Altay State Pedagogical Institute.

L.V. Levantovskiy, K.V. Malkov, I.G. Mamedov, A.L. Nersisyan, S.V. Nikitin and V.I. Sizikov—"Qualitative Methods for Analysis of the Stability, Complexity and Stabilization of Dynamic Systems." Recommended by the Komsomol committee and young scientists council of the USSR Academy of Sciences VNII for Systems Research.

I.Ye. Litvin, V.V. Vysochanskiy, A.S. Strekopytov, A.P. Pozdnyakov, V.P. Borodavkin, M.D. Semanishin, A.V. Yeremeyev,, S.A. Yegurtsov, A.A. Sedykh and K.P. Konovalov—"Development of a Technical Diagnostics System for Main Gas and Oil Pipelines to Ensure the Reliability and Efficiency of Their Operation." Recommended by the Komsomol committee of the USSR Ministry for Construction of Petroleum and Gas Industry Enterprises and the "Soyuzorgenergogaz" Production Association.

Ye.V. Lobanov, V.N. Artamonov, I.V. Viktorova, I.V. Grushetskiy, S.V. Kravchenko, A.N. Polyakov, A.V. Popov, G.Zh. Sakhvadze, S.V. Sokolovskiy and M.S.

Strekalova—"Development and Introduction of Methods for Increasing Machine Reliability and Life." Recommended by the USSR Academy of Sciences Institute for Machine Sciences imeni A.A. Blagonravov.

S.V. Mitrokhin, V.S. Zontov, S.N. Klyamkin, S.I. Kuliyev, A.N. Sytnikov and M.V. Lototskiy—A cycle of works "Creation of Highly-Efficient Metal-Hybrid Materials for the Accumulation of Hydrogen." Recommended by the Komsomol committee and young scientists council of Moscow State University imeni M.V. Lomonosov and by the UkSSR Academy of Sciences Institute of Machine Building Problems (Kharkov).

A.B. Molitvoslovov, O.G. Skipenko, I.M. Buriyev, V.N. Yegiyev, M.M. Zhadkevich, S.A. Kapranov, N.N. Ionochkina, Yu.T. Kadoshchuk, I.V. Kozlov and I.P. Englin—"New Methods for Surgical Treatment of Diseases of the Pancreas." Recommended by the USSR Academy of Medical Sciences All-Union Scientific Center for Surgery.

R. Muradov and O.Sh. Sarimsakov—"Improvement of Pneumatic Transport System Elements for the Purpose of Preserving Fiber and Seed Quality and Reducing Their Loss." Recommended by the Namangan branch of the Tashkent Institute for Textile and Light Industry imeni Yu. Akhunbabayev.

S.A. Nepogodyev, N.E. Nifantyev and Yu.Ye. Tsvetkov—A cycle of works "Chemical Synthesis of Regular Natural Polysaccharides—Plant Glucose and Bacterial Hexose-Aminoglucose." Recommended by the USSR Academy of Sciences Institute of Organic Chemistry imeni N.D. Zelinskiy.

S.F. Nikonov, S.I. Mikhaylin, Ye.Z. Golukhova, I.V. Kruglyakov, G.V. Mirskiy, I.I. Pilshchikova, V.V. Chernyshov, A.Yu. Bredikis, M.I. Laan and M.A. Shkolnikova—"Clinic, Diagnosis, Prognosis and New Approaches to the Treatment of Non-ischemic Forms of Heart Rhythm Disturbances in a Young Person." Recommended by the USSR Academy of Medical Sciences Institute of Cardiovascular Surgery imeni A.N. Bakulev.

V.V. Neroyev, L.V. Blagodatnyy, V.V. Kislov, A.A. Oganesyan and S.A. Korotkikh—"Development of New Comprehensive Methods for the Diagnosis and Treatment of Patients with Penetrating Fragment Wounds to the Eyeball." Recommended by the Moscow NII for Eye Diseases imeni Gelmgolts.

M.A. Osipov and A.N. Semenov—Cycle of works on the physics of liquid crystals, polymers and liquid-crystal polymer systems. Recommended by the Komsomol committee and young scientists council of Moscow State University imeni M.V. Lomonosov.

V.V. Pokrovskiy and Z.K. Suvorova—"Scientific Development and Practical Application of Measures to Prevent the Spread of AIDS in the USSR." Recommended by the USSR Minzdrav TsNII for Epidemiology.

B.Ye. Simkin, A.V. Antonenko, Yu.V. Karpachevskiy, A.O. Lebedev, I.Ye. Kavych, A.A. Kupriyanov, D.Ye. Mashtakov, N.F. Chishinskiy and S.N. Kalinichenko—"Development, Application and Study of Digital Regulators for the Main Regulation Circuit of Nuclear Power Plants on the Basis of ASUT-1000-2 Technical Systems in Power Units with the VVER-1000 Reactors." Recommended by the Zaporozhye Nuclear Power Plant.

S.Yu. Storozhenko—"Insects with Incomplete Metamorphosis (Orthopterans and Bird Lice) of the Far East." Recommended by the USSR Academy of Sciences Far Eastern Department Soil Biology Institute.

A.S. Shamayev—"Mathematical Tasks of the Theory of Elastic Composite and Perforated Elastic Materials." Recommended by the USSR Academy of Sciences Institute of Problems in Mechanics.

Soviet Scholars Study U. S. Management Experiments

18140050a Moscow TEKHNIKA I NAUKA in Russian No 8, Aug 88 pp 43-45

[Article by Aleksey Igorevich Izyumov, candidate of economic sciences, Institute of the USA and Canada of the USSR Academy of Sciences, under the rubric "Organization of Production Abroad": "U. S. A.: The Quiet Revolution in Management"; first paragraph is source introduction]

[Text] Completion. For beginning see TEKHNIKA I NAUKA, No 7, 1988.

The participation of workers in the organization of their own labor and management is from the point of view of the top management of corporations a relatively less dangerous form of involving rank-and-file personnel in the management process (compared, for example, to the participation of workers in the joint-stock capital of "their" companies). At the present time, it is possible to distinguish three principal types of such participation: in organization and management of work and production quality at the shop level; in creation of worker councils and committees of workers and managers; and in profits (the plans of Scanlon and others like him).

To the first there belongs first of all the practice of "enrichment of labor," changing of work stations and forming of "autonomous brigades." The subject of the reform here is organization of the immediate labor process—either at the individual work station or within the framework of sectors of production, which is turned over from managers to the judgment of the actual performers of the work. Experiments of this type were organized within the framework of special programs for upgrading the quality of working conditions, for which purpose councils, consisting of representatives of workers and managers, were created in companies on quality of working conditions.

In granting to workers the right to determine for themselves conditions of work and rest, the possibility to change a work station and through selected brigade leaders to come to an agreement with management on changes of those or other conditions of production and programs of upgrading the quality of the worker's life contribute to improving the status of the worker, to a certain extent humanize his labor and create prerequisites for the fuller realization of his powers and capabilities.

The founder of the theory at the basis of present experiments with work participation is considered in the United States to be Elton Mayo. His conception of "human relations in industry" was developed in the'20s on the basis of Mayo's managerial experience in the company of Western Electric.

At the start of the'80s, there were in the United States more than 2,000 registered experiments involving the participation of workers at the shop level. A large portion of them came into being in the course of the'70s.

At the present time, the principles of enriching labor and forming autonomous brigades are being particularly widely used in the automobile industry. Thus at the plant of the General Motors firm in Pontiac (State of Michigan), all workers engaged in the production of the new model of Pontiac's Fiero are divided into 125 autonomous brigades, each of which is responsible for the production of one or another assembly. Within a brigade, the workers themselves allocate among themselves duties, order of work and monitor the state of equipment and production quality. This has made it possible to eliminate practically completely inspectors and timekeepers [khronometristy]. Similar conditions have been created at the American-Japanese enterprises in Fremont (State of California). This was called in the American Press the biggest experiment in the field of labor relations. At this plant, belonging jointly to the companies of General Motors and Toyota, 2,500 workers were also divided up into brigades of 5-7 persons. Each member of the brigade receives at company expense the vocational training required for the performance of any type of work in the brigade sector. Narrow specialization has been replaced by a broad one. Moreover, all the plant's workers fall into three skill categories.

A unique variety is presented by so-called "quality-control groups" consisting of groups of workers (5-15 persons) that regularly gather together on a voluntary basis for the consideration of questions of raising quality of production and labor productivity. Although the original discoverer of quality groups is considered to be the American scientist William Deming, they have become most widespread in Japan. American corporations began to adopt on a mass basis the "Japanese experiment" of "quality groups" only in the second half of the'70s. In the beginning of the'80s, such groups were organized at several hundred of the largest corporations and thousands of small and medium-size companies. According to the results of a study conducted on the order of the New York Stock Exchange's board, "quality groups" at the present time exist in one form or another at 44 percent of American companies employing more than 500 persons.

The next type of involvement of workers in management is that of worker councils and committees of workers and managers. These organizations are created as a rule on the initiative of management of corporations and constitute an additional channel for contacts between managers and workers outside the traditional system of collective agreements. The councils are primarily engaged in production questions and perform information and advisory functions. The duties and rights of the councils are usually not strictly defined, and all questions are considered on an individual basis in the order of their receipt. In distinction to similar organizations

widely prevalent in Western European countries and usually possessing there a higher and legislatively determined status, councils in the United States as a rule do not have the capability of implementing decisions on their own.

The total number of committees of workers and managers in the United States is estimated at approximately several thousand. According to the data of a department of the New York Stock Exchange, such committees exist in 25 percent of the companies with more than 500 employees.

A more complex form of organization of worker participation is a system that includes a mechanism linking the efforts of workers to raise production efficiency to their getting a portion of the company's profits. Programs of participation in profits differ in methods of accounting the contribution of workers to the company's profit growth and corresponding determination of the share of profit due them. Thus in the Improshare Program counting is done on the basis of a standard norm of time required for the manufacture of a single item. The relative hours "saved" in the event of attaining a higher than standard labor productivity is paid to workers in the form of a premium (bonus). In the so-called Rooker plans ["plany Rukera"], the original indicator is the ratio of pay and conditional net production for a base (usually 7-year) period. A reduced ratio versus the standard one means the production of a larger volume of fixed net production per wage unit. The portion of the additional profit received as a result is paid to workers in the form of an addition to their wages.

Scanlon plans enjoy the greatest popularity and prevalence of all the programs of workers' participation in profits employed by American corporations. The sum of the profit subject to distribution among workers is calculated here in about the same way as in "Rooker plans" with the sole difference that the wages are correlated not with fixed net production but with net sales.

A special feature of the Scanlon plans is that they as a rule include in addition to distribution of profits two other forms of worker participation, namely participation in the organization of production and monitoring of quality at the base level and the creation of committees of workers and managers with advisory and recommending functions. Thus, compared to other forms of worker participation, "Scanlon plans" possess a more integrated and completed character.

Despite a long history and quite successful experience of use, Scanlon plans have not received recognition among large corporations. The great majority of companies making use of them employ no fewer than 1,000 persons. At the same time, the number of these companies in the United States according to estimates amounts to 700-800. At the same time, the number of companies employing simpler forms of participation in profits is significantly larger and since the beginning of the'80s includes the largest corporations. Thus, the practice of workers' participation in profits was introduced during 1982-1984 by the giant automobile makers Ford and General Motors. Appropriate points were introduced (for the first time in the history of these corporations) in collective agreements concluded by them with the United Automakers Union [Obyedinennyy profsoyuz avtostroiteley]. In 1984, each worker at General Motors received from profit an addition to his wages in an average amount of 500 dollars and Ford workers an average of 1,600 dollars.

The participation of workers in management on the scale of an entire corporation presupposes delegating their representatives to the highest organs of the latter, first of all the council of directors. Such a practice is to be found at a number of Western European countries. It is especially widespread in West Germany, where in accordance with the law workers and employees must constitute a third of the council of directors in all companies with more than 500 employees and a half of the council in companies with more than 2,000 persons. In the United States, however, the involvement of worker representatives in the highest organs of corporation is more of an exception. One such exception was the decision of the Chrysler Corporation in 1979 to bring into its council of directors the president of the United Auto Makers Union Douglas Frazer. It is curious that at the time of the confrontation between the workers and managment of Chrysler in the course of conclusion of a collection agreement D. Frazer was obliged to leave the council of directors as a consequence of the conflict arising in his duties. This case illustrates the unsuitability of the European practice of involving workers in the highest organs of management from the point of view of the heads of American corporations and also from the point of view of the traditions of American trade unions. The position of the latter was clearly enunciated by D. Frazer's colleague Glenn Watts, president of the communication workers union: "I do not want to sit on the council and engage in the affairs of the corporation. I want as a trade union representative to have the freedom to criticize management."

Participation and Effectiveness

The copious literature available in the United States on the problems of workers' participation in management does not provide an unambiguous answer to the question of the economic effectiveness of such practice. On the one hand, positive consequences are noted of the practice of involving workers in management at different levels, on the other, many authors direct attention to the fragmentary character of the surveys, the not fully representative character of elections, the presence of contradictory data and major methodological difficulties in determining the concrete contribution of "worker participation" in growth of efficiency, which leaves too much room for subjective evaluations. Furthermore, as justly noted by one of the experts on this problem, the director of the Washington Center for the Investigation

of Social Policy Professor S. Levitan, "most evaluations of the success of corresponding experiments come from managers of corporations who can in no way be called uninterested observers."

The biggest positive results, as shown by the data, are provided by the organization of "quality groups" and councils for improvement of the quality of working life. According to the conclusions of two other large investigations conducted toward the end of the'70s, this results in 80 percent of cases in a rise of labor productivity and growth of the degree of satisfaction with the work. Corporations that have successfully introduced such a practice obtain large benefits. Thus, the Lockheed Company through the use of proposals made at its enterprises by "quality groups" was enabled to save 3 million dollars in two and a half years, which exceeds sixfold the outlays on the organization of these groups. At the same time, at many companies experiments with "quality groups" have not been successful inasmuch as they were conducted formally by managers and frequently degenerated to simple monthly conferences dealing with narrow production problems. The inability or lack of desire of managers to establish relations of mutual respect and trust with workers is the cause of the fact that almost three-fourths of the programs for improving the quality of working life cease to exist in the course of the first 5 years.

With the use by companies of programs of participation in profits, according to the research data of the National Center for Productivity and Quality of Working Life, companies indicate in two out of three cases a significant improvement in the principal production indicators and growth of workers' "motivation." Examples of the most successful use of participation in profits are such companies as Donelly Mirrors (a plant for the production of mirrors for motor vehicles in the city of Holland in the State of Michigan, 460 employees), Parker Pen (a fountain-pen plant in the city of Janesville in the State of Washington, 700 employees) and TRW (a plant for aircraft engines in the city of Harrisburg in the State of Pennsylvania, 1,072 employees). In the last-named, workers contributed in just one year of operation of the Scanlon plan 750 efficiency proposals of which 80 percent were used and in that year workers were paid 750,000 dollars out of profits, which comprised 12.8 percent of the average annual wage.

At the same time, implementation of Scanlon plans at many companies has not produced desirable results and often was terminated by a unilateral decision of the managers. In the opinion of the American researchers R. Katsel and D. Yankelovich "far from all and not even the majority of companies are able to create conditions necessary for the successful functioning of Scanlon plans. The limited spread of these programs is due to the difficulties of simultaneous involvement of workers and management in them, the fear of the latter of granting workers any sort of significant power in the adoption of decisions and the great dependence of the company's profit size on market factors, none of which are connected to the efficiency and quality of its workers' labor.

A characteristic example in this regard is the history of the organization of such committees at plants of the metalworking companies Kaiser Steel (city of Fontana in the State of California) and Youngstown Sheet and Tube (Youngstown in the State of Ohio) in the middle of the'70s. In the first instance, labor productivity grew 32 percent in 6 months of the committee's existence, defective work was sharply reduced and the attitude of workers toward work was improved. In the second, in three years, growth of productivity connected with the work of the committee amounted to 5.5 percent, idling was reduced from 10 percent to 3 percent of worktime and absence from work from 15 percent to 7 percent. It would have seemed that positive results were evident. Despite this, in both cases the committees of workers and management were disbanded after the passage of a very short time. At the Kaiser Steel plant, initiators of terminating the experiment were managers who thought that the "inordinate" successes connected with the participation of workers in management discredited their own ability to skillfully manage the enterprise. At the plant in Youngstown, on the other hand, the trade union rejected continued participation in the committee. In the opinion of the workers, the actions of the committee brought many benefits to the company and provided too little for the workers. Naturally, not all attempts at organization of committees involving the participation of workers and management are doomed to failure, but the presented examples demonstrate the great difficulties connected with overcoming conflicting attitudes existing at capitalistic enterprises.

The problems caused by conflicting goals and interests of workers and managers are common to all types of experiments involving worker participation, including "quality groups," programs for improving the quality of working life, Scanlon plans and participation of workers in councils of directors of corporations. It is namely in the clash of interests that the causes of reverses and failures of many of theseexperiments are to be found.

On the part of management, the main obstacle to the development of successful practical work of worker participation lies in an aversion to share with workers control over production. Managers of companies are ready to do everything to create in workers the appearance of participation in adopted decisions and in this way to stimulate their involvement in the affairs of the company and greater labor productivity, but they stubbornly resist any attempts of workers to obtain real control over any area of management decisions.

Particularly bitter resistance to experiments in worker participation is shown by middle-level managers. In the opinion of Professor S. Levitan, "the medium strata of management have become the chief institutional obstacles even to most well-intentioned attempts at involving

workers in management." Such a situation is not surprising inasmuch as medium-level managers constitute the foundation of the traditional hierarchical structure of the typical American corporation. The contradiction in the position of these managers lies in the fact that they want to get greater loyalty and zeal from workers but refuse to voluntarily pay for this with any sort of significant loss of their power.

From this point of view, it is understandable why not only the failure of this or that experiment with worker participation but also with "inordinately" big success could serve as a signal for managers for their termination. Following the abolition on the initiative of management of a successfujl program of worker participation at one of the plants of the Polaroid firm, its coordinator candidly states: "It was too successful. The managers decided that they did not want too-qualified worker operators since the ability revealed in the latter of adopting responsible decisions created too serious a threat to the traditional structure of management and control."

Occurring within the narrow framework delineated by the laws of private-capitalist production, the process of introduction of new forms and its control and organization are of a deeply contradictory, inconsistent character. Despite this, restructuring tendencies are gaining force in the form of their objective conditionality and will probably continue in the foreseeable future.

Letter Provokes Heated Discussion on S&T Financial, Organizational Reforms

Letter by Chemical Researcher

18140341 Moscow SOVETSKAYA ROSSIYA in Russian 19 Jun 88 p 3

[Letter by T. Bogacheva, scientific associate, VNIIgidroliz, candidate of chemical sciences, Leningrad, under the rubric: "Discussion Letter From a Leningrad Chemist: Why Is It Unprofitable For Us 'To Do Science?'": "Rehabilitation of the Researcher"]

[Text] Respected editors! The spiritual renaissance which our society is undergoing is not only opening our eyes to the recent past, but is also enabling us to make sense of processes which are occurring in many areas today, including in sectorial science. I admit that I might be mistaken about some things. Possibly, the answer that I am presenting is not the only one. It is frightening to think of the squall of reproaches that will descend upon me if this letter is published. However, the striking contradiction between the goals which are being declared and reality turns any job into a punishment. It is be better to lose it entirely, than to continue a silent and wretched existence.

The thesis of the growing role of science under the conditions of restructuring, repeated frequently from the highest rostrums, warms the heart of every scientific associate. However, the real situation in the ordinary sectorial scientific research institute [SRI] is rapidly turning this enthusiasm into profound alarm. This is also reflected in the CPSU Central Committee Theses for the 19th All-Union Party Conference, which noted that "significant changes in scientific and technical progress have not occurred. Meanwhile, effective mechanisms for including the interests of labor collectives in this important work have not been found." Why is this so? I would like to reflect on this a bit.

In its 40 years of existence, an entire industrial sector has been created by the All-Union Scientific Research Institute for the Hydrolysis of Plant Materials, where I work, which produces fodder proteins from wood-pulp. Today, everyone is yelling at the top of their lungs about this sector's devastating effect on the surrounding environment. Through the public's efforts, part of the Kirishskiy Biochemical Plant, which is part of our "Gidrolizprom" Association, has been closed. One would assume that the specialists at VNIIgidroliz, more than 500 people in all, are working intensely to try to solve this and other difficult problems. Is this really so?

At first glance, order reigns at the scientific research institute. For being two minutes late at the start of a work day, the watchman takes the worker's pass away. From 10:00 to 13:00 hours a lady in the office notes arrival from a business trip. Orders for photographic work are taken from 9:30 to 10:00. The fiction library closes at exactly 13:00. Reception hours at the financial department are after 15:00. Everything is scheduled by the clock... True, the democrats in the supply department will take your order at any time, although they generally will not fill it.

So, at what time does the scientist set up an experiment, without which there is no technology? He sets it up when he wants to. If he feels like it, in general. It is better for his direct manager if he does not want to. For example, my laboratory head, D.D. Savelyev, orders me to depart at mid-week for the vegetable depot and I begin to protest, since an entire week will be wasted—such is the nature of a biological experiment. An argument starts up, in the course of which they explain to me that if I do not go to the vegetable depot, the leader will receive a reprimand. However, an unfinished experiment will in no way affect either his or my own well-being.

The existing situation does have its causes. Until quite recently, our institute, like all scientific research institutions, received money in quantity "for existing," in strict proportion to the number of workers. We wrote our work plan ourselves and it was considered fulfilled if the scientific council approved the report on time. Yet, since the council is no inter-officer's widow, the plan always turned out to be fulfilled.

Real science is disadvantageous under these conditions. If you work poorly—you receive your salary, but if you work well—trouble is inevitably added to the salary. After all, the implementation of any, even the simplest idea, requires efforts, which means a fuss and therefore annoys everyone. This is "anti-cost-accounting," which has been brought to everyone's notice. Today it is called the obstruction mechanism.

Yet, after all, it was not always this way. The fodder protein problem arose in the 1940s. The leaders of those years, having created a new sector where there was literally nothing, were themselves leading lights of a world class. To this day at the institute there are still legends about V.I. Sharkov, M.Ya. Kalyuzhniy and K.P. Andreyev.

However, V.I. Sharkov and his associates conceived of the sector as a utilizer of wood-pulp and agricultural waste products, which should have been represented by small plants located near the raw material sources. The technology developed for this purpose was entirely good. It makes it possible to carry out the process with an output close to the theoretical and to effectively cleanse the sewer outflow. However, in accordance with the overall tendencies toward gigantomania, despite common sense, the line toward increasing the capacity of the plants prevailed. The genie was let out of the bottle. Now these plants do not have enough raw materials. Their own waste products have become a problem.

Ever since the institute was established, one subject has been cultivated—wood-pulp hydrolysis to obtain yeasts, alcohol and furfural. This is just as destructive for a scientific collective, as one-crop cultivation is for agriculture. Somehow, everyone gradually stopped noticing that science had gone forward, that yeasts no longer conformed to increasing demands. Developed countries stopped using them for fodder long ago... In proportion to the solution of basic theoretical, experimental and technological problems, the subject matter becomes petty and in the end begins being fabricated. Knowledge is turned into dogma, methodological approaches ossify and a private terminology, incomprehensible to specialists in related fields, forms.

Since modern biotechnology has no relation whatsoever to our direct concerns, we do not need new information about our colleagues' achievements. It is no surprise that we almost never read technical literature. Library day for a candidate of sciences is equivalent to a legalized shopping trip on work time. Any attempt to send a young associate to do library work meets with open opposition—it is not done. Our yeast production laboratory has virtually no scientific seminars, which would have discussed work plans and the obtained results. This voluntary self-isolation forms a specific atmosphere of semi-secrecy, it is difficult to find out what is being done in the neighboring group and sometimes even at the adjacent work desk. If the almost complete lack of modern equipment is added to this, the natural decline in the level of research being conducted and in the collective's skills becomes understandable.

I would like to be properly understood. Good, conscientious people work here. We actively discuss the changes taking place in the country and sincerely support restructuring at the political information meetings, regularly held during work time. However, the realization that restructuring is also our personal affair and that it is oriented against our own work style as well, it seems, has still not set in.

They could object that this was before cost-accounting. The situation should be different, now that the decision has been made to convert sectorial science to cost-accounting and self-financing. Let us take a look. Have you heard of a scientific research institute complaining because the ministry gave it a state order that was too large? Indeed, you have not. Because, in fact, the state order is the very same budget financing. VNIIgidroliz has been ordered to do three state-order projects in its field of specialization. Since the money is virtually guaranteed, it is more profitable to do the easiest work for it. Thus, traditional areas in which they have already worked for many years, including wood-pulp hydrolysis, were included in the state-order project. It should be explained that nobody needs hydrolysate, the result of this process, in itself. It is a raw material for obtaining microbiological synthesis products. Its quality should be determined depending on the specific features of the process in which the hydrolysate will be used. Thus, nobody knows what this product is intended for—there are no such developments. Therefore, the project turns into... hydrolysis for its own sake. Moreover, work on the very promising and ecologically safe fermentation hydrolysis of cellulose is excluded from the plan. This is new and difficult work: who wants to risk it? All of these problems were openly discussed by the scientific council, but the project was approved unanimously nonetheless, since it enables many people to live peacefully for a while.

Thus, even after introducing cost-accounting, it is not even a question of some sort of problem-oriented planning or the competitive distribution of state orders. The spheres of influence are more strictly divided and the monopolization of science is strengthening, with all of the demoralizing consequences. Involuntarily, one recalls pre-restructuring times, when there was enough money.

However, the state order is only part of the budget. Where does the rest come from? As of 1 January, the sectorial plants converted to self-financing. Now they have reason to pay only for developments which provide a real, not a contrived economic effect. The consequences have not been slow to reveal themselves. The Kropotkinskiy Hydrolysis Plant refused to sign the preliminary agreement. The Tavdinskiy Plant generally estranged itself—it sent a letter, the essence of which

was: we, they say, are paying you through an old friendship, but you are not doing anything. We swallowed the insult. It is simple to assume that industry, having adapted to the new conditions, will make even higher demands.

There is one solution—to find work. Our institute's new leadership has evaluated the situation as pre-crisis. "We have nothing to sell, and we have no surpluses"—this was the conclusion of the scientific council meeting, which considered the plans for 1988. In the course of the discussion, it became clear that only the individual laboratory heads realized this. The majority are inclined to blame the administration for insufficiently energetic assertion of the institute's interests at the ministry. As far as the collective on the whole is concerned, for the time being it is passive, for it is customarily hoping that everything will remain as it was. This ostrich-like stance may cost dearly. After all, if the rate at which the economic reform is being put into practice remains the same, we will lag a year or two behind restructuring. It is impossible to turn out good surplus products in such a brief time period. This means that they must be taken in ready-made form. The only place where there are bases for new technologies is the Academy of Sciences and its institutes.

However, even here work is at a standstill for the time being. I am judging by my own experience: in the course of the last 1.5 years, results have been obtained by a small group in the course of theoretical research, carried out with naked enthusiasm along with three academic institutes, which, with stressed efforts, will make it possible to create the first polymer surface probe by the end of this year. This reagent, nothing similar to which is being produced by a single country in the world, can be used in fine biochemical research. On its basis, for various purposes, one can derive an entire family of highly-effective instruments for studying the cellular surface structures. The development of production on the scale of a few tons would be profitable. This can be carried out in a short time by a small number of people, and it is an expensive product.

However, the proposal to include this work in the laboratory's plan was rejected as a matter of course due to its nonconformity to the traditional subject area.

Perhaps this is not fairly widespread? Then why did the proposal by the USSR Academy of Sciences Institute of Biochemistry and Physiology of Micro-organisms to begin creating technology to produce glucose and fructose syrups on the basis of the institute's developments also fail to find support? The scale is tremendous: in the U.S., the annual sale volume for this product numbers in the billions of dollars. The economic expedience is obvious—throughout the world this technology is used, provides a profit and makes it possible to save a great deal of sugar. Moreover, the institute's development is good—it uses a technological idea which is better than that which is implemented abroad. Finally, the fact that we are capable of this work and that the reorientation requires minimal efforts is of great importance. However, nevertheless our leadership disagrees. Any attempts to use available results in the interests of other economic sectors encounters furious resistance.

I would like to note something else which is also very important: it is unrealistic to increase the efficiency of scientific research without revolutionary changes in work organization. Any scientific problem is solved by a group consisting of 3-5 people on the average. The institute has dozens of these groups, whose tasks are often in no way related. The administration has to coordinate their work and the director makes all of the decisions. One cannot even take one step without his signature: one can neither request information, nor, conversely, give it. It is impossible to spend a ruble! I will not even mention the more difficult problems. However, one person, even be he a Solomon, is physically unable to keep track of everything. The scientific council is also unable, even if it met continuously... The hopes placed on intra-institute cost-accounting also seem unwarranted. After all, today the absolute majority interprets cost-accounting as a new method for allocating bonuses. In fact, all of the cost-accounting subdivision's rights have been reduced to distributing the allocated material incentives fund and submitting suggestions and complaints about subcontractors to the administration. All of the real power—the formation of subject areas, distribution of resources, approval of deduction norms for maintaining the management system and the material incentives fund—remain in the administration's hands.

It seems untenable to me to count on only democracy and glasnost, without reinforcing them through economic measures. For example, consider the recent labor collective council elections. At first glance, it is entirely democratic: 56 candidates for 21 places, and no pressure at all. However, as the elections showed, the winners of this popularity contest include the nicest people, who in this respect are also convinced opponents to any changes at the institute whatsoever.

Thus, we must start with the formation of an energetic collective, which actively hungers for change. In other words, like-minded people must be given an opportunity to unite voluntarily and independently resolve the question of their subordinance. In this connection, it will most likely turn out that, instead of one institute, several will appear with optimal numbers of personnel, corresponding to the selected task. For this, we need only rejoice.

They could object that I am appealing for production anarchy. However, VNIIgidroliz has fulfilled its task—a sector has been created and is functioning. Yet the ministry distributes orders better among newly-formed companies on a competitive basis.

However, since the ministry is unable to feed everyone, the new companies should be granted the status of cooperatives. If they know how to make contracts, they can form an association, as stipulated by the Law on the Cooperative. In this regard, common accounting, planning and supply departments could be formed. At first glance, the changes may be minimal. In reality, the essence is changed. The leaders of associations, as well as of auxiliary subdivisions, which are beginning to subsist on volunteer deductions from individual laboratories, rapidly discern the meaning of their own activity, which lies in optimally organizing the work of scientific associates.

The proposed solution simplifies the establishment of a cooperative movement in science. The idea of a cooperative itself is very popular among scientific workers. However, even the most ardent supporters, among which this author includes herself, are halted by the utter impossibility of solving the material support problem: laboratory premises with hoods, microbiological isolation containers and so on, and even a minimal set of special, including imported, instruments. All of this is extremely scarce. The problem can be eliminated only by organizing cooperatives instead of the existing scientific research institutes. Labor productivity in such collectives, formed on a democratic basis, automatically increases without capital investments. It is not just a question of material incentives—at first, the purses of cooperative members will hardly grow fat. However, after all, happiness comes from more than money. The moral and psychological climate will improve. The right to make independent decisions will eliminate the numerous conflicts and intrigues, in terms of the extent of which scientific research institutes are second only to theatrical collectives. The opportunity to work in an environment with like-minded people, to do one's job, which one considers important, properly and to experience happiness from this—this is really no incentive?

We should also not be blind to the difficulties which are arising. Of course, there will be people who will find no place for themselves in the new structure. They have no ideas of their own, and others will not accept them because of low skills or unreliability. After all, coworkers know each person's true value without any certification. This is a difficult problem and will be solved painfully. At the initial stages, the cooperatives themselves will be sharply in need of support: the lack of experience in organizational work will be telling and resistance will be great. Nevertheless, I am sure that this is the right decision. It must be done, if only as an experiment. I propose starting with ourselves.

Coworkers, Officials Respond

18140341 Moscow SOVETSKAYA ROSSIYA in Russian 5 Aug 88 p 3

[Article by correspondents A. Kalinichenko and N. Fokina under the "Polemics" rubric: "What is Cooperative Science For? Sectorial Institute Collective Discusses Letter by Leningrad Chemist Tatyana Bogacheva"]

Tatyana Bogacheva lost this battle. At least, so it seemed when we left the institute hall, where a discussion of T. Bogacheva's letter, "Rehabilitation of the Researcher," published in SOVETSKAYA ROSSIYA, had taken place. A squall of reproach descended upon her. How could a VNIIgidroliz scientific associate, a candidate of chemical sciences, be so bold as to declare that today the institute has essentially exhausted its previous possibilities! Or that the subject of its developments is petty, and hence the professional level of the associates is declining. Moreover, the sector, which produces fodder protein from wood-pulp, is devastating the surrounding environment. In this situation, what can "betrayal" threaten the institute with? With the fact that it will be left without work. Yet, many associates have earned a scientific degree with blood and sweat, and have a certain status. Should all of this be crossed out in one stroke?

It seems that precisely this fear forced a large segment of the collective to give an organized rebuff to the "disturber of the peace." After the article's publication, at VNIIgidroliz the yeast production laboratory where T. Bogacheva works soon held a meeting, and on the same day, the labor collective council had a conference. They decided that T. Bogacheva's article in SOVETSKAYA ROSSIYA was unethical. The sectorial institute's honor, as stated at the meeting, had been wounded... Moral damage had been inflicted. As always in such cases, the author's "civic stance" was questioned: "A patriot of the hydrolysis industry would never have written such an article."

The discussion of the article, organized after this by the editors, also began in such an atmosphere. Any VNIIgidroliz associate could participate. About half of the 500 workers attended the discussion. We shall stipulate immediately that, in preparing this material, we set aside its departmental framework and tried to elucidate the opinion of other scientists from other sectorial institutes in Leningrad on this urgent problem.

They Rejected

"Our association, like the entire sector, has excellent prospects," said **V. Yrabov, general director of the "Gidrolizprom" scientific production association** which VNIIgidroliz is part of, in noting T. Bogacheva's accusation. "Minmedbioprom is implementing a comprehensive program to technologically re-equipping functioning enterprises. It is helping us to bring all plants to projected capacity, to increase the output of fodder yeasts, xylite and furfural, and to make production profitable. New technologies are being created. As a result, we will be able to offer the country the entire gamut of fundamentally new products for medical, food and technical purposes."

It cannot be denied that this is a future which promises much. However, there is one detail: this program has been underway for 3 years and there are still no results. As **V. Ambrosov, deputy minister,** informed the editors, the production output at the hydrolysis plants virtually is

not growing and in the current 5-year period lags behind the control figures by a factor of 2. The deputy minister cites the same low effectiveness of VNIIgidroliz's work as one of the causes. After all, the plants belonging to the association are unable to develop normally without an ecologically clean technology. Meanwhile, however, the institute has not solved the problem of utilizing of basic and auxiliary production waste products.

Yet, after all, T. Bogacheva wrote precisely about this type of lag: "The striking contradiction between declared purposes and reality turns any job into a punishment." Thus, from year to year the usual subjects are put in the institute's plans—for example, this same hydrolysis. Its product, hydrolysate, is ecologically harmful and nobody needs it in and of itself, although it could become an initial raw material for obtaining other products. However, precisely these studies are not appearing in the plans. They are difficult, labor-intensive and do not guarantee rapid success. The institute has no interest in them, since it receives funds for fairly easy work, so the traditional subjects, which they have been working on for a long time at the scientific research institute, are put in the state order. This is widespread. For the time being, a mechanism which would force sectorial science to pursue difficult, fundamentally new directions in the first priority, has not been found.

Discussion participants almost in unanimously retorted to T. Bogacheva: what about cost-accounting? "The institute's conversion as of 1 January 1988 to full cost-accounting and self-financing has created practical conditions for correcting shortcomings in sectorial science in general and in the activities of VNIIgidroliz in particular," O. Shapovalov, acting director of the institute, I. Nikolayev, party buro secretary, and M. Yezhova, trade union committee chairman, wrote to the editors. They also explained that state orders from the ministry comprise 55 percent overall, and that the volume of work according to economic contracts with plants has already exceeded 1.5 million rubles, but last year, before the conversion, it was only 250,000 rubles. Their logic is as follows: money is not being paid without reason, and if the ministry sees that the effective fulfillment of the state order is questionable, it will cease financing.

However, was this so? No,it was not and would hardly be, since the ministry's centralized fund is distributed among sub-departmental institutes... according to their area of specialization. Yet, no one except this VNII is working on wood-pulp hydrolysis in Minmiedbioprom. This means that the institute obtains all funds somewhat automatically. Even the hydrolysis plants, if they dislike the head institute's scientific production, can do nothing: again, they have no choice. Thus, cost-accounting has not only failed to eliminate a sectorial institute's monopoly, but has strengthened and deepened it without solving the main problem: accelerating research and raising output.

Here is the opinion of **M. Safonova, docent, Leningrad Technological Institute for the Cellulose and Paper Industry:**

In order to eliminate monopoly, we need true cost-accounting which gives the enterprise, as well as the customer, contractor and researcher, the right to choose. All of this is possible under competitive conditions.

"Decisive steps are needed to improve the management of scientific and technical progress, to overcome departmental barriers," stated a report to the 19th All-Union Party Conference. "We must open up space for the maximum display of talent, for creative initiative and self-management, equal competition and the competitiveness of scientific ideas and opinions. A number of scientists are also bringing up the question of the expedience of diversifying methods for organizing science and also, in this respect, of going to a reasonable combination of state and cooperative forms."

A simple conclusion suggests itself: there should be more "vendors" of scientific production. Yet where can they come from? Must we really create two or three more such scientific research institutes? No, wrote T. Bogacheva, provide the opportunity to divide the one cumbersome VNIIgidroliz up into small, volunteer scientific research groups. Essentially, these would be unique scientific cooperatives.

They Debated

"Cooperatives—what rubbish," **A. Klyukvin, senior scientific associate,** categorically stated. "We must solve the problems of the strategy and tactics for reprocessing wood-pulp through the efforts of large institutes. Even without this, we have promising studies which were suppressed, since we have been hammered flat by the ministry, without whose agreement we cannot take a single step. Furthermore, the institute's director is pressured by the association. So it is, that we are all under a powerful press, in last place. The same situation exists in other scientific research institutes as well. How can we restructure the organization of work within the institute, when we are being squeezed from all sides?"

"A cooperative, as we understand it, can exist in the service sphere, for instance, for sewing clothing," **M. Yezhova, trade union committee chairman,** continued the debate. "But this is science. We are working according to the ministry's plan and according to its instructions. It is not our fault if they do not introduce our developments."

There were many such statements. The opponents swept the idea itself of the existence of scientific cooperatives from the threshold. Maybe this does sound unusual. However, is it really so impossible?

After the discussion, we asked this question of **L. Abalkin, director, USSR Academy of Sciences Institute of Economics, academician:**

"I see no fundamental objections to cooperatives in science," said Leonid Ivanovich. "Yet 2 or 3 years ago, hardly anyone would have taken proposals to convert

state enterprises into cooperative ones seriously. Today this is becoming a mass phenomenon. There are many examples of this. So, why must we believe that the scientific sphere is excluded beforehand? I think that such an experiment, in any case, would be useful, and it might be able to work well precisely in the applied sciences. Today, when all institutes of this sphere have converted to cost-accounting and should exist in dependence on the volume of work being fulfilled and the effectiveness of scientific development, I see no problems with having or not having cooperatives here. The rest is details."

However, precisely these ill-stared "details" have seemed like an insuperable barrier for workers and leaders at VNIIgidroliz: "We work according to the ministry's plan," "we are hammered flat by the ministry." The scientists at the sectorial institute are also unable to think that science can exist apart from the ministry as well.

Here is the opinion of **V. Milov, senior scientific worker, All-Union Scientific Research Institute for Metrology imeni D.I. Mendeleyev:**

"The organizational form of sectorial science was determined at a time when the country did not have enough specialists and had to concentrate the problem-solving efforts for the sector. The situation changed long ago. Today, scientific subdivisions, in my opinion, should include more flexible forms: for example, a group is formed to solve a certain problem, and afterwards it breaks up... I think that any scientific research institute could become an association of cooperatives for performing scientific research work."

O. Shapovalov, acting director, VNIIgidroliz:

"For instance, the ministry allocates millions of rubles annually for exploring the problem of continuous high-temperature hydrolysis. Where would a cooperative get this kind of money?"

V. Ryabov:

"Above all, financing. Even if the exploration of a certain problem ends with negative results, sectorial science has a financial guarantee. A cooperative will not have such guarantees. This also means they will not begin to develop promising trends. It is the psychology of cooperative workers that they are guided only by market considerations, to extract an immediate profit."

K. Vyunov, department head:

"I also think that no one will risk financing a cooperative. And not only promising studies, but also economic contracts. This is because any development takes time. In 5 years, there is laboratory work, testing on the rack, mastery at the plant... Although the latter, perhaps, is not the researcher's work. He must "sell" the development—and everything. However, everyone knows what enterprise engineering services are like. All the same, the researcher will have to help."

Let us comment: after all, the discussion has already turned to details—how to finance, how to introduce. Possibly, the interlocutors are admitting, without wanting to, that cooperatives in science are possible. As far as financing is concerned... Today, its sources could also probably be diverse—from the ministry's centralized fund, or through contracts with enterprises. Risk? Indeed, in paying an institute money, is a plant not taking a risk?

L. Zysin, department head:

"Everything is not so simple. What will the cooperative live on, while it is developing an idea? Working on cooperative principles, you should be sure of a positive result, because, if nothing turns out, you will have to return the advance."

M. Safonova:

"There is yet another question here: what kind of cost-accounting enterprise would want to finance promising research? Probably, any way is possible. For instance, the USSR State Committee on Science and Technology has been charged with managing scientific and technical progress. What if associations of scientific cooperatives conclude direct contracts with the GKNT? In this case, state budget financing would occur on a competitive basis and, mainly, without ministerial and departmental involvement."

Thus, the conversation delved into the most acute problems of sectorial science. What, in fact, must be advanced? The research collective or the scientific problem? After all, today the problem is not so much the lack of funds, as how they are used. No one would even consider giving a cooperative funds "according to category." Only for a problem. In this case, it seems fewer funds are needed... However, another question is also justified: how will cooperative workers get equipment?

L. Gusarova, senior scientific associate:

"See what kind of equipment we have! Can one receive reliable results using it? Only two laboratories in the institute are well-equipped. What will these numerous groups work with?"

A. Sizov, leading scientific associate:

"But how can you say what will be done with good equipment? Before ordering equipment, you must have a problem which will be solved using it. Once we bought imported equipment, which is costly. We got an American protein analyzer—no one in our laboratory has been able to cope with it. We transferred it to another lab, but it stands idle there as well."

S. Stegalkina, engineer:

"One of the institute's leading scientific associates acquired a chromatography instrument. They waited several months for the installers. Later, it turned out that there were no associates who were able to work on it. The instrument stands idle."

How many times have we heard something like this? Innumerable. "They bought equipment and it was unnecessary" is the most over-used topic of articles in recent decades. Can this happen in a cooperative? The answer is simple. Today's shortages most often arise from the fact that not even the institutes possess unique instruments, but their departments and laboratories do. A cooperative hardly even needs its own equipment. Leasing is cheaper. So, if several multi-sectorial scientific research institutes would become associations of cooperatives, the problem with equipment would be basically solved.

L. Zysin:

"Not really, even if so: a scientist, having sensed a good idea on the tip of his pen, leaves the scientific research institute, recruits a collective, takes out a loan at the bank, leases the necessary equipment, does the work, receives money for it and later returns to the scientific research institute. Within the framework of an institute, a cooperative is possible only at the introduction stage..."

I. Gorshkov, NOT laboratory head:

"I agree. Here at VNIIgidroliz it would be possible in the department for organizing the introduction of scientific developments, and nowhere else."

They Began to Think

You have already noted, most likely, that for now T. Bogacheva's idea has found supporters only beyond the walls of her native institute. In the same hall where her direct colleagues met, a wall of collective "biofield" was sturdily erected, which was not letting agreement with Bogacheva get through. At that time it began to seem that the battle was lost. However, then a young man, **Aleksandr Kozlovskiy, senior ASU engineer,** stepped up to the stage:

"I share the alarm of the article's author regarding the fact that we do little work in direct science. I liked Bogacheva's letter, and I accept the cooperative as a problem-oriented creative collective. What are we protecting ourselves from now? From freedom of scientific research."

Question from the hall:

"Would you join a scientific cooperative?"

"Yes."

And we heard... applause.

Then **Svetlana Stegalkina,** a young institute worker, explained to us:

"There were many in the hall who agreed with Tatyana Ivanovna, who recognized that the institute is turning in circles and that we are not realizing ourselves as researchers. However, for the time being today not very many have the strength to admit this. The silent ones have just expressed themselves by applauding Kozlovskiy."

We understand. It is hard to break the customary stereotyped concepts. It is hard to correlate and coordinate the freedom of scientific creativity—the main thing for scientists—with the utilitarian orientation of cooperatives. It is even more difficult to overcome the instinct for self-preservation and stand up fearlessly with a violator of the established order. I. Gorshkov has already called us from Moscow in order to refine certain formulations in his opinion, which permitted cooperatives only in the introduction department. Now we heard the following:

"I am afraid, cost-accounting will force us all the same to create collectives to solve some sort of entirely definite problem. The leader who recruits such a collective, reminds me of a director who forms a film group. He would hardly take on extras who do not play parts. He will only take those whom he needs."

While avoiding the words "scientific cooperative," you can see that Iosif Ilich, essentially, has it in mind. Perhaps, this is somewhat explained by the phenomenon of collective egotism: what if there are too many "non-players," what if I myself end up on wrong side of the film?

"I want to be understood properly," insisted Tatyana Ivanovna. This conversation, alas, occurred after the discussion. The hall's negative reaction did not allow her to say everything that she wanted there. "I am not fighting for freedom in scientific research for the sake of freedom itself. And I am not calling for anarchy. However, I insist on the fact that freedom is profitable."

That is?

"Mastery of the new is unthinkable with tied hands. Reorganizing a scientific research institute on a cooperative basis presumes removing the institute from its subordination to a ministry with a simultaneous profound change in structure, on the principles of real cost-accounting. This entails a chain of transformations. The need to struggle for each ruble forces such a company to seek out and to harness new ideas in its projects.

In order to increase competitiveness, independent expert analysis is needed. It is terrible to say, but in its present form the scientific council is not needed in this case."

"Moreover, acceleration of scientific and technical progress, in my opinion, is possible only by converting to the competitive distribution of funds for scientific research, in which one would have to struggle in each specific case for the "head" position. Decisions would be made based on expert analysis, independent of the implementer."

"Suppose for a minute that they adopt this system. If a project is approved as a result of a competition, its author must have the opportunity to form a collective, acquire materials and equipment, and conclude contracts with partners. In other words, he should have the rights of a legal entity. Even the director of a sectorial scientific research institute, entangled by ministerial restrictions and norms, does not have these powers today. However, in accordance with the law which was passed, it is exactly the cooperative enterprise which does have them. Of course, the scientific cooperative is not a panacea for apathy and inactivity, but it is one of the effective treatments against this chronic ailment. Only one. Possibly, there are also other variants. We should not be afraid to look for them..."

When we left the hall, it seemed as though Tatyana Ivanovna had lost this battle. But when we looked at our notes and listened to our recordings and paged through protocols sent to the editors again, we saw this timid, but important support. "You know," said L. Gusarova, "I liked Bogacheva's position because of the fact that she forces us to think about our own problems and to find ways to solve them." If this is true, then the debate was not lost. As Pasternak put it: "You should not distinguish defeat from victory yourself." Indeed, it is difficult to distinguish between these two hypostases of forward motion.

Blood Substitute Scandal Reveals Academy Internal Politics

18140042 Moscow OGONEK in Russian
No 36, Sep 88 pp 6-8

[Article by Aleksandr Ryskin: "The Price of Blood Blood"; first paragraph is OGONEK introduction]

[Text] In principle it is possible to survive a shortage of fashionable shoes in stores or a lack of "videos" on the counters. Some sick person in the literal sense does not survive the shortage of a needed medicine at a drugstore or at a hospital. This is very harmful to the health: to know that somewhere a new agent is already being produced, is being used, and exists, and not to get it. It might, of course, also not help the sick person. Its lack is always harmful.

I had all this in mind and had thought about all this, when I went to the Institute of Biological Physics of the USSR Academy of Sciences in the Moscow area city of Pushchino. The synthetic blood preparation Perftoran, which led in time of development all foreign analogs, was developed several years ago precisely there, in the laboratory of medical biophysics, under the supervision of Professor Feliks Fedorovich Beloyartsev.

They had hardly begun to use an emulsion of Perftoran in the clinic, when surgeons came across its many truly miraculous properties. Patients, who had been unconscious for days, came to in an hour after a transfusion of the "synthetic blood." The most serious wounds of the arms, legs, and digits, which threaten amputation, often completely disappeared in patients after treatment with Perftoran. No country of the world had in the middle of the 1980's a synthetic blood preparation of such a class.

It was used in Afghanistan under field conditions—where it was difficult to collect for each wounded person donor blood of the needed group. Colonel of the Medical Service Viktor Vasilyevich Moroz, a resuscitator of the Main Military Hospital imeni Burdenko, recalls: "Our wound-covered, gashed lads, many of whom on all counts ought to have been unconscious for weeks, after a transfusion of Perftoran revived literally before our eyes. We would not have succeeded in saving many of them, had we not had the 'synthetic blood'."

At the Institute of Transplantology and Artificial Organs Doctor of Sciences Nina Andreyevna Onishchenko showed me the reports on the clinical tests of 1985, when kidneys, which had been treated with the synthetic blood, one after the other began to take, when tens of people, who for years were tied to hemodialyzers and were doomed to immobility and to slow death, were saved. Of the 47 transplanted kidneys 39 took—an enormous success! And the fact that a donor kidney, which was been treated with the "synthetic blood," can live after this outside the body for several days, is entirely a fantasy. Hence, it is possible to deliver it to the patient from any corner of the country. Until now this was nearly impossible—a donor kidney usually dies in a day.

Or another most serious illness—cerebral edemata—one of the most prevalent causes of death in case of cranial traumas, and this is half of all accidents. People die from it in resuscitations, in spite of brilliant surgery and the most advanced treatment. And suddenly there is a miracle: patients with cerebral edemata soon after a transfusion of Perftoran come to and note an unusual clarity of consciousness and a drastic improvement of how they feel. This was a triumph over a nearly incurable illness. There is not one and not two, but hundreds of such successful applications. At the Kiev Institute of Neurosurgery, at the Dnepropetrovsk Clinic, and in Moscow: at the Hospital imeni Burdenko, at the Institute of Transplantology and Artificial Organs, at the Center of

Children's Surgery, at the Institute imeni Vishnevskiy, where Perftoran enabled surgeons to perform operations many hours long on a dry stopped heart.

These results of clinical tests in the fall of 1985 were reported in Pushchino in two scientific councils.

I was at the Institute of Biophysics and read the verbatim records of all the statements. The physicians, who gathered in those days in Pushchino, were unanimous: the preparation is urgently needed in clinical practice. All the clinics of the country, the first aid service, and resuscitation departments need it. The physicians did not know that the fate of the blue blood had already been decided without them in high instances.

In July 1985, when the tests of the preparation had been completed at clinics, when a pilot works, with whose placement into operation all the clinics of Moscow could have met already in a year their needs for the "synthetic blood," had already been erected at the Institute of Biophysics, a letter, in which it was stated that "competent organs" have materials that testify to the adverse effect on the human body of perfluorinated carbons, which are a part of the emulsion of Perftoran, arrived at the USSR Ministry of Health.

It is possible to understand the bewilderment of former Minister of Health Burenkov, to whom this letter was addressed. The results of the testing of Perftoran are dazzling, physicians are demanding its production, but here are some slightly frightening materials that smell of all but criminal activity. But it cannot be helped, and a commission of the USSR Ministry of Health leaves for Pushchino. Soon it pronounces its conclusion: "The commission, which was set up by the USSR Ministry of Health, established that...the experimental studies of the preparation Perftoran were not conducted fully—the cancinogenic, mutagenic, teratogenic, and embryotoxic effect of the preparation and its effect on the immune system of the body were inadequately studied...."

On this basis in October 1985 by Order No 1380 of the USSR Ministry of Health, which was signed by Deputy Minister Safonov, the clinical tests of Perftoran were halted and its production was stopped.

What is it possible to say here? I found out: by January 1984, before permission of the Pharmaceutical Committee for clinical tests had been given, in the laboratory of Beloyartsev more than 4,000 experiments had been done, and all the research required by the Pharmaceutical Committee had been conducted. But by October 1985, when the clinical tests had been completed at clinics, a change of the regulations of the Pharmaceutical Committee suddenly occurred. In accordance with the new charter for the majority of medicines, which were permitted for tests, it was necessary to have detailed information on the carcinogenicity, teratogenicity, and embryotoxy. Previously this was not required. So that Beloyartsev did not violate any instructions here, everything was done properly, and the Ministry of Health in those days did not question the quality of the preparation. It was simply necessary to observe the new and, perhaps, necessary formality. They observed it. For this 3 years were required. And today all the studies, which were listed in the order, have been performed. Good reports on the preparation have come from all the institutions which made an additional evaluation. So that all the doubts of "competent organs" with respect to the safety of Perftoran today have disappeared naturally. The safety of the "synthetic blood" has been proven. So what?

The 3 year old ban as before remains in force. The production of the synthetic blood, which all hospitals and clinics of the country need, it seems, is being postponed for an unspecified time. In Pushchino there is a finished pilot works, which is capable already today of supplying medicine with the "synthetic blood." Physicians, who are ready to work with it, are waiting. Everyone is waiting. But meanwhile people, whom it would be possible to save, continue to die in resuscitations. And this is at a time when there is a chronic shortage of donor blood at clinics. There is not enough even in peacetime, not to mention the enormous need for blood under the extreme conditions of war or in case of accidents like the Chernobyl accident. And this is after the discovery of the AIDS virus, when many countries have begun to eliminate the previously established banks of donor blood and to speed up the development of synthetic blood, when in Japan, the United States, and Sweden they are reproducing our 3 year old results and are going farther. It has gone so far that one of the Swedish pharmaceutical firms has announced its willingness to sell in the Soviet Union its own components for a fluorocarbon blood substitute. To sell it for much money, for currency. Will we really buy what we can have ourselves and at a much lower price?

But it is not enough that the 3 year old ban, which has cost our country the loss of priority in work on synthetic blood, as before remains in force—recently I also found out another thing: all the additional research, which was conducted so carefully these 3 years at various medical scientific research institutes of the country, was conducted in vain.

In the same new charter of the Pharmaceutical Committee, it turns out, it was stipulated that for preparations, which are used in resuscitation with respect to vital signs, the condition of separate studies of mutagenicity, carcinogenicity, and embryotoxy is not mandatory.

The respected experts of the Ministry of Health 3 years ago simply "forgot" to take a look at this specifying paragraph of their own regulations.

Here it is the right time to look at the problem from a different point of view. Let us look through the eyes of former Deputy Minister Safonov, who signed this

"historic" order. He also had his own logic. First of all such blood (of the same purpose and class) had already been developed in our country. It was developed through a department of the USSR Ministry of Health at the prominent Institute of Hematology and Blood Transfusion in Moscow, and recognized people assembled there, and there were many more of them than in Beloyartsev's laboratory, and this theme of the first day was in their plan all 15 years. But Beloyartsev, who worked through a department of the USSR Academy of Sciences, made his "blood" and delivered it to the clinic in just 5 years. Thus, his laboratory was in the position of "a competing firm." It turned out to be a thorn in the flesh, suddenly, in an unplanned manner.

Now put yourself in the position of the deputy minister, before whose eyes is the entire medical sector, whose head is swelling with matters, and who suddenly finds out that Perfukol—that is what the synthetic emulsion at the Institute of Hematology was called—proved to be toxic and produced serious complications—all the clinicians were unanimous in their evaluations and refused to test such an "unfinished" synthetic blood. But this is a preparation, which was cultivated, it can be said, in the greenhouse of the Ministry of Health, millions had been spent on it, hematology specialists made it and had been making it for 15 years. How would you order the deputy minister to behave, if such a preparation proved to be poor? There is one answer: with the utmost reluctance to ban its testing for a while and to send it back for modification. That is what they did. But in those same days the preparation of Beloyartsev after successful tests in clinics was announced for the State Prize and successfully passed through the selection commission.

Were the developers of Perfukol able to endure this? No, they were not able to endure this. Nikolay Ivanovich Afonin, chief of a laboratory at the Institute of Hematology and head of the theme, personally wrote letters to the Committee for Lenin and State Prizes—he demanded: "include us as well in the list of those submitted for the award." They did not include them. And then a new letter—to Vice President of the USSR Academy of Sciences Yu.A. Ovchinnikov. Yuriy Anatolyevich personally undertook to restore "justice." And...he actually vetoed Perfloran, having written a sharp note to the Committee for Lenin and State Prizes. But soon the same Ovchinnikov at the request of the Ministry of Health formed the first commission, which left for Pushchino for evidence.

Order No 1380 on the halt of all work on the synthetic blood was promulgated in the Ministry of Health on the basis of the conclusion of this commission.

What happened here, the reader will ask. What happened is that just concepts, concern for humaneness and for the health of people, concepts, which are dear to us all, served as a screen for unjust deeds, for the settling of departmental and personal scores.

Let us allow the scientific opponents of Beloyartsev speak. Here is what one of them, an academician and a well-known biochemist, said in a interview granted to the newspaper SOVETSKAYA ROSSIYA on 19 August 1987:

"...But here is what it came to: two academic institutes simultaneously found nothing better than to deal with 'blue blood.' This, after all, is simply perfluorocarbons, which in extreme situations, in case of a wound can also be useful. But it is not blood! Why instill in a wide range of readers that this is a blood substitute, moreover, without any reservations?"

Why, criticism is a useful matter, the opinions in science can be different, it is possible to argue both about terms and about the essence of a matter. There is nothing bad in the fact that one scientist has criticized the work of another scientist and has noted shortcomings which exist in the organization of scientific work.

The trouble is something else. The trouble is that all these years the vice president of the USSR Academy of Sciences shared the opinion of the critic, the chairman of the section of chemical, technological, and biological sciences of the USSR Academy of Sciences, under whose jurisdiction are the financing (rubles, foreign currency), personnel, bonuses, and foreign travel of the associates of all biological institutes of the academy, completely agreed with him. The curator of the Biological Research Center in Pushchino took the same position. But simply speaking, all these years the same person, Academician Yu.A. Ovchinnikov, was in all these responsible posts. He is the venerable critic, the interview with whom I have just quoted. Yuriy Anatolyevich almost from the establishment of the program "synthetic blood" was opposed to the work of Beloyartsev. Almost from the very start he supported the work of the Institute of Hematology.

Will the truth emerge in such a dispute?

Judge for yourself.

In 1980 and 1981 Yu.A. Ovchinnikov actively contributed to the preparation of the state scientific and technical program "synthetic blood." There were formidable reasons for this. Back in 1980 at the organizational conference in Pushchino Yu.A. Ovchinnikov was invited to head this promising program. From that time as the supervisor he participated in all the meetings connected with "synthetic blood." Then a sudden 180-degree turn followed—the attitude of Academician Ovchinnikov toward the program changes. What happened?

An insult happened.

In 1982 Academy President Aleksandrov, having weighed everything, came to the conclusion that Academic Ovchinnikov could not head the program "synthetic blood." Are there reasons? They did exist, and

they were formidable. First, Yuriy Anatolyevich held by that time several responsible posts at the Academy. He was overloaded with work as vice president, chairman of a section, a member of many commissions, the editor of many journals, curator of the scientific center in Pushchino, and director of the Institute of Bioorganic Chemistry. Moreover, Yuriy Anatolyevich was already in charge at that time of one state scientific and technical program. Is that not a lot for one person? He might not physically pull the program "synthetic blood." That is how Academician Aleksandrov reasoned, having eliminated the name of Ovchinnikov from the list of supervisors of the scientific and technical program. Corresponding Member of the USSR Academy of Sciences G.R. Ivanitskiy, director of the Institute of Biophysics in Pushchino, was invited to take this post. But he refused, having suggested the candidacy of Academician I.L. Knunyants, a most prominent specialist in the chemistry of fluorocarbons and having agreed to be his deputy and to head together with Professor Beloyartsev the biophysical portion of the work. On 17 September 1982 by a decree of the USSR State Committee for Science and Technology, the USSR State Planning Committee, and the Presidium of the USSR Academy of Sciences the candidacy of Knunyants was approved and the suggestion of Ivanitskiy was adopted. Since that day all the troubles at the Institute of Biophysics also began. Was Academician Ovchinnikov able to forgive fate such "injustice"? I do not know. Perhaps, he was able. But he did not.

I will not weary the reader with a description of how with each success of the developers of the "blue blood" the relations between Yu.A. Ovchinnikov and G.R. Ivanitskiy deteriorated, how for several years all the requests and suggestions of the developers of Perftoran came up against an undisguised boycott in the person of the vice president of the USSR Academy of Sciences. How this boycott gradually developed into a campaign of persecution, the initiators of which did not balk at any means from the organization of denunciations and anonymous letters to investigative organs to the spreading of rumors, which bring discredit upon the honor and good name of the people, who had something to do with the work on Perftoran.

No, I am not claiming that everything that happened subsequently with the "synthetic blood" and its authors was personally inspired by Academician Ovchinnikov. Here, of course, both the departmental vanities of the USSR Ministry of Health and the biased letters to the highest instances, which were written by the "competitors" from the Institute of Hematology, played their role.

The contribution of Academician Ovchinnikov to domestic science is indisputable and is recognized not only in our country, but also abroad. Yuriy Anatolyevich was an honorary member and an honorary doctor of a number of academies of sciences and universities of the world and the chairman of the Federation of European Biochemical Societies and was in charge of the Biogen Interbranch Scientific Technical Complex. On his initiative and under his supervision work was performed on the development of genetically engineered interferons and insulin. Performing much scientific organizational work, he was chairman of the interdepartmental scientific and technical council for problems of physical chemical biology and biotechnology of the USSR State Committee for Science and Technology and the USSR Academy of Sciences and scientific supervisor of the biotechnological direction of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries. From 1974 to 1988 he was vice president of the USSR Academy of Sciences.

Even this short service record characterizes the breadth of his interests and the scale of his personality.

However, the authority of Academician Ovchinnikov does not preclude the possibility of a honest, impartial discussion which in a certain way also touches upon his name.

The more I "wormed my way" into this "case," the more obvious it became that in the actions of nearly all the commissions, which starting in the summer of 1985 one after the other rained down from the Ministry of Health and the Presidium of the USSR Academy of Sciences onto the heads of the developers of Perftoran, and in the actions of "competent organs" there was some strange, as if well thought out uniformity. Both in how easily they got anonymous letters going and with what persistence the inquiry and commissions found within the institute people who at some time had conflicts with Professor Beloyartsev, the developer of the "synthetic blood." And with what regularity the materials of the two scientific councils for Perftoran were ignored and the opinions of the best medical personnel of the country, who had conducted clinical tests of the preparation, were rejected. How in general obstacles were put in the way of any attempts to discuss the problem at a representative scientific debate.

Behind all this one could feel someone's invisible, but powerful hand, which, if it did not directly guide the actions of the investigators and commissions, in any case gave both the commissions and the inquiry a bill of exchange for arbitrariness and complete impunity.

In the oppressive, thick atmosphere Beloyartsev and his colleagues still attempted to work, but this became nearly impossible. It was necessary to defend themselves.

A somewhat frightening dossier has piled up on my desk in the last half a year. Here there are the records of searches, the decree of the Serpukhov Interrayon Procuracy on the removal of the defendant Beloyartsev from his position, the materials of several audits, which worked at the Institute of Biophysics, and the desperate

letters of colleagues and fellow workers of Beloyartsev. Here there is also an official memorandum, which was written by Feliks Fedorovich himself. I will cite just excerpts from it:

"I bring to your notice that an unhealthy atmosphere has formed in the laboratory of medical biophysics, which I manage, and around it.

"...Thus, beginning in September of this year the associates of my laboratory from time to time have been summoned for interviews (moreover, some several times each). These summons occur during working hours and without the consent of the management of the laboratory and the institute. The interviews last several hours each. These circumstances, as well as the tone of the interviews, during which incompetent, but frightening accusations of conducting experiments on people (!!!) are advanced, are keeping my associates in a state of fear and panic!...." And so on for several pages.

Here is the end of this letter and the beginning of the tragedy: "Today any resident of Pushchino will confidently say to you: 'Beloyartsev? He is the one, against whom a criminal case has been instituted in the procuracy and for whom prison is crying.' I would not be exaggerating in the least if I said that everything listed by me has not simply complicated our scientific work. They look at us like criminals. Under these conditions I am forced to halt the work and to ask for your assistance.

"[Signed] Professor F.F. Beloyartsev, manager of the laboratory of medical biophysics"

From where could such serious accusations have arisen? I needed half a year in order to coax a solution to this riddle out of the quagmire of hush-ups and profound secrecy and to understand from the example of Beloyartsev how in general "cases" of this sort develop. Their main peculiarity is that they drag on, as a rule, for a long time—at times for several years. Here the inquiry obviously also did not hurry with the case of Beloyartsev. The materials (denunciations, anonymous letters), which cast doubt on the safety of the preparation, served, as is known, as the grounds for it. In all 3 years were spent on an evaluation that demonstrated the opposite. All this time the weight of the accusation hung on the neck of the people who were involved in the development of Perftoran. But if we assume (the entire "case" is made up of such assumptions) that the preparation is safe, it is possible to declare the clinical tests, which were permitted by the Pharmaceutical Committee, "the conducting of experiments on people." Given such a statement of the question you cannot make allowances. An entire series of accusations and suppositions, each of which separately is not worth anything, emerges, but, having been associated with "experiments on people," all these "violations of reporting on the consumption of alcohol," "abuses of office" (?!), and "the longing for self-advertisement" create a certain ominous background, supporting each other by their proximity. With the passage of time more and more people are drawn into the inquiry, moreover, the testimony of each one is examined in the same distorting magnifying glass of the main accusation, which like "the original sin" towers over all the witnesses being questioned. That is how an atmosphere of universal suspicion is created, circles of universal guilt disperse in the muddy water of the "case." And every cast of the investigative drag net pulls out a new floundering "criminal." All people, who were associated with the "case," are checked. Perhaps they will succeed in scraping together something. One works with alcohol. The registers of the consumption of alcohol for 5 years are raised. Another works with narcotics. This is already quite hot, but were there not abuses? Prove that you are innocent. I do not know, reader, who here should prove it to whom? So far no one has abolished the principle of the presumption of innocence.

Meanwhile Beloyartsev was removed from the position of chief of the laboratory in accordance with the letter of the Serpukhov Interrayon Procuracy back at the very beginning of the inquiry. None of the accusations had been proven even indirectly, but they had already intimidated the man, they say, see that this will not happen again. And rumors about the "criminal" professor began to spread through the entire institute. Even among the colleagues of Beloyartsev people, who began to shun him, appeared. But the inquiry "was digging ground." And it found, after all, "foul play." The event was an old, but sensational one. They also wrote about it in the newspapers, told about it on television, no one made any secrets of what had happened. The "discovery," which was made by the investigative group, consisted in the following. Several years before this entire investigative carousel, when Beloyartsev was still just about to certify the preparation for clinical tests, a tragic incident, which posed a difficult moral problem for the developer of Perftoran, happened. They brought to the All-Union Center of Children's Surgery a 5 year old girl, who had been maimed in an automobile accident. The girl was unconscious. It turned out: at the rayon hospital they had confused the blood group and had caused shock, which aggravated the already serious condition of the patient. A scalped wound of the thigh, several fractures with massive blood loss—this is called "trauma incompatible with life." She had a rare blood group—this blood was not available at the institute. An individual donor is needed—but when will they succeed in finding him? How is the shock to be relieved? How is the child to be sustained until the arrival of blood of the needed group? The consultation met. They tried all means. And then they decided: there is no longer anything to lose—it is necessary to call Professor Beloyartsev at the Institute of Biophysics. It was 1983. Hardly anyone knew yet about the new blood substitute—the preparation had been tested on animals. There was no trace of any decisions of the Pharmaceutical Committee. What is to be done? The instructions state: one must not inject in a patient a preparation which has not been allowed by the Pharmaceutical Committee. But there is also another law in medicine: for the sake of saving the life of a patient, if all

permitted means have been exhausted, the consultation has the right to assume all responsibility and to use a preparation from the latest, but not yet approved ones. The physicians of the Center of Children's Surgery, Deputy Minister of Health Academician Isakov, and Doctor Mikhelson assumed such responsibility. The developer, Feliks Fedorovich Beloyartsev, assumed such responsibility. A physician himself by profession and calling, the son and grandson of a physician—he tore along in a car from Pushchino to Moscow and stopped at the doors of the clinic. The girl was still alive. For 2 days they sustained the child on Perftoran, then chose a donor—and as a result saved her. But 2 years later, having recalled this incident, they accused the physicians of violating the instructions of the Pharmaceutical Committee and Beloyartsev himself of "conducting experiments on people." The staff members of the investigative organs became frequent visitors of the surgeons who had used Perftoran.

I found out: for the physicians there was one justification—the consultation. In all cases the preparation was administered in accordance with the vital signs. Feliks Fedorovich did not have this justification. He, the developer, did not have the right to give the preparation to the surgeons.... Guilt had been proved, but I admit: this information made me feel uneasy. The job of legal instances is to determine the degree of guilt of the defendant. But I cannot humanly imagine that Feliks Fedorovich would have acted any differently.

The persecutors of Beloyartsev would be right, if they had turned out to be right. If the patients, who received Perftoran, actually suffered. If the girl, who had gotten into the orbit of this event, had really died, if the "synthetic blood" had proved to be a poison. But the girl survived, but patients returned to life, but the "blood" began to save people.

Feliks Fedorovich Beloyartsev is no long able and never will be able to stick up for his honor and good name. His nerves failed, the inhuman tension of the December days of 1985, which were the last in his life, told. On 18 December, not having endured five humiliating interrogations and searches, he hung himself in his dacha soon after the departure of the staff members of the investigative organs.

Again and again I carefully read the sparing lines of the obituary, attempting to size up behind them the man, whom I did not have occasion to know alive. In this fate there were sharp breaks and unexpected turns, in which a resolute and exceptional character is divined. For Feliks Fedorovich 1979, when he, a talented young anesthesiologist of the Institute of Cardiovascular Surgery imeni Bakulev, suddenly got carried away by the problem of "synthetic blood" and left practical medicine forever, was such a crucial year. What did the departure for science mean for him? This meant giving up anesthesiology—a job which he knew to perfection. A job, which gave him a reputation, money, and a secure position in society. He was among the brigade of surgeons, who were entrusted to operate on Academician Keldysh, and participated in the most complicated operations on vessels of the brain. He was able to continue his brilliant, dizzy career in practical medicine—he had everything for this and was himself from a family of medical personnel—the pride of the Astrakhan Medical Institute, a student, who already in the forth year undertook operations which are within the reach of only physicians of extra class. A doctor of science at 34 is a most rare event in medicine. At 35 the head of a department at one of the best clinics of the country. All roads were open to him. But all the same he left the Institute imeni Bakulev. He left for science, in which he had to start everything from scratch. His authority as a surgeon and anesthesiologist, his clinical experience, and his name did not mean too much for biophysics and for basic academic science.

Meeting during these months with tens of people who knew Feliks Fedorovich, I heard a large number of times strikingly contradictory opinions about him. Everyone, whom I questioned, agreed in just one thing: yes, Beloyartsev was not lacking in ambition, but a mercenary spirit, money grubbing, and the mercantile extraction of benefits—this was totally absent in him.

Why am I relating all this? Because the suspicious inquiry from the very start undertook to seek "mercenary motives."

Evidence? By all means. He had a dacha, a car, a garage—much here was unclear for the inquiry. But precisely here our criminologists did not clear up anything.

At his house during the search they found a small bottle of alcohol—150 milliliters, which appeared in the report as evidence. What they say there, in criminology!

On the day of the funeral a letter arrived at the Institute of Biophysics: "I can no longer live in an atmosphere of slander and betrayal..." and the signature: F.F. Beloyartsev.

They drove the man to his death. They ruined a cause, to which he had devoted several years of intense labor. And there seem to be no guilty parties. Was there really not anyone who could have interceded and shielded from slander and calumny the essentially innocent man?

Both at that time during the terrible autumn days of 1985 and then 2 years in a row and today the people, for whom courage, honesty with oneself, elevation of the spirit in case of any trials, tenacity, and contempt for villainy, from wherever it originates—all these best qualities of the Russian intellectual are not an empty sound, existed, remained, and are multiplying. Such is Corresponding Member of the USSR Academy of Sciences Genrikh Romanovich Ivanitskiy, former director of the Institute of Biophysics and former manager of the Pushchino Center, who stood up for the honor and good name of Feliks Fedorovich and paid with his favorite job, his health, and his unblemished reputation. Such is Doctor of Sciences Simon Elyevich Shnol, head of a laboratory

of the Institute of Biophysics, who from the very first days raised a voice in defense of Beloyartsev. Such are tens of other associates, who put their signatures on a collective letter of the USSR Procuracy with the request to investigate and punish those to blame for the death of Feliks Fedorovich.

All right, they "got" their own way. Again the institute was in a fever, new blows now rained down on the head of Ivanitskiy and his deputy, Boris Fedorovich Tretyak, interrogations of associates during working hours, an avalanche of inspection commissions, the Department for Combating the Embezzlement of Socialist Property and Speculation, the People's Control—all these invincible arguments of the authorities were not slow in appearing in the unequal dispute which began 3 years ago. All right, the investigative organs once again proved that no one can ever complain with impunity about the staff members of their system.

What was next? Next there was havoc. Genrikh Romanovich Ivanitskiy, one of the supervisors of the program "synthetic blood," was removed from the position of director of the Institute of Biophysics. He suffered a heart attack. And at the very height of the inquiry there was a new blow: he was expelled from the party by a decision of the buro of the Serpukhov City Committee of the CPSU—the minutes of the meeting were published in the local city newspaper KOMMUNIST.

This, strictly speaking, is also the sad ending of this event. Secret activity conquered open activity. The complicated turns of fortune of this case have already been forgotten by many people, nasty rumors and provincial gossip, which are unworthy of any of the best academic institutes, remained. Envy, conceit, and squabbles without much ado remained. This entire atmosphere killed Professor Beloyartsev. Feliks Fedorovich Beloyartsev, a complicated, contradictory, talented, and single-minded person, perished. He perished, having achieved outstanding results. Beloyartsev is no longer alive. And here it is the right time to write the popular "but his cause lives." Alas, this is also the truth. Yes, his "cause" lives, the verbatim records in investigative organs swell volume after volume. Their staff members are continuing their regular short visits to the Institute of Biophysics.

The pilot works, which was completed after the death of Feliks Fedorovich, stands idle in Pushchino. A works which can already today supply military and civilian medicine with unique synthetic blood. The living collective, which formed during many years of work, is demoralized. The new management of the institute is afraid to make decisions. But somewhere people continue to die from ischemia of the kidneys and heart, from thrombi of vessels and edemata of the brain, from acute massive blood loss. People, whom today it would be possible to save.

Up to 5 liters of donor blood are used today during an operation on the heart with artificial circulation. A liter of it costs more than 300 rubles. A liter of the synthetic blood, which was made in the laboratory of Beloyartsev, costs 70 rubles. This figure is conditional. For the present Perftoran does not have a price, as every experimental preparation does not have a price. If at some time series production of the "blue blood" is begun, it will cost much less. But should one talk about the price, when it is a matter of life? There are also other calculations. The "blue blood" cost one of its developers—Professor Beloyartsev—his life. It cost many honest and until now respected physicians and scientists their good name.

Are foreign intelligence services dangerous for us? Perhaps. But such a situation helps them very much: a very important, including defense result was obtained. One manager was driven to his death, they are driving another to his. But all the results, in essence, have been published. The actual halt by us of the work is being reported in the newspaper. And here are fresh data: already not only Japan, the United States, and Sweden, but also England are completing the development of a "synthetic blood," which, to all appearances, is already better than ours. The English have twice reported on the clinical results which were obtained several years ago in the USSR. They are going farther—they are developing a preparation which surpasses in stability all the ones that now exist. All right, such is the fate of many Soviet discoveries. Soon, very soon we will catch up—experience exists.

Minister Burenkov and his deputy Safonov no longer hold their positions, Academician Ovchinnikov recently died, and the staff members of the investigative organs, perhaps, will also be replaced. And no one will be made to answer for the harm done to the country.

But it also makes sense to finish off Ivanitskiy—if they succeed in dragging out the inquiry several more years, hindering the production of Perftoran, 2-3 years later the interested people at the Institute of Hematology of the Ministry of Health will be able to ascribe to themselves the service of its development. It is a great matter—the glory and awards will be great! Time will pass, and the description of one of the most important successes of the USSR Academy of Sciences in an applied field—the development of fluorocarbon blood substitutes in a record short time, which led in time of development all foreign analogs, will go down in the history of our science.

Time will pass—we often speak about the successes of our science in the past tense, having buried its heroes—and varnished portraits of the developers and oversimplified situations will be presented.

But we need to learn lessons immediately: everything that happened and is happening is a detriment to our country. It should be offset, it should become impossible in the near future—one of the meanings of the concept "restructuring" lies precisely in this.

END OF FICHE DATE FILMED

11 Jan 89